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The Commonwealth of Massachusetts

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ANNUAL REPORT

OF THE

METROPOLITAN DISTRICT COMMISSION

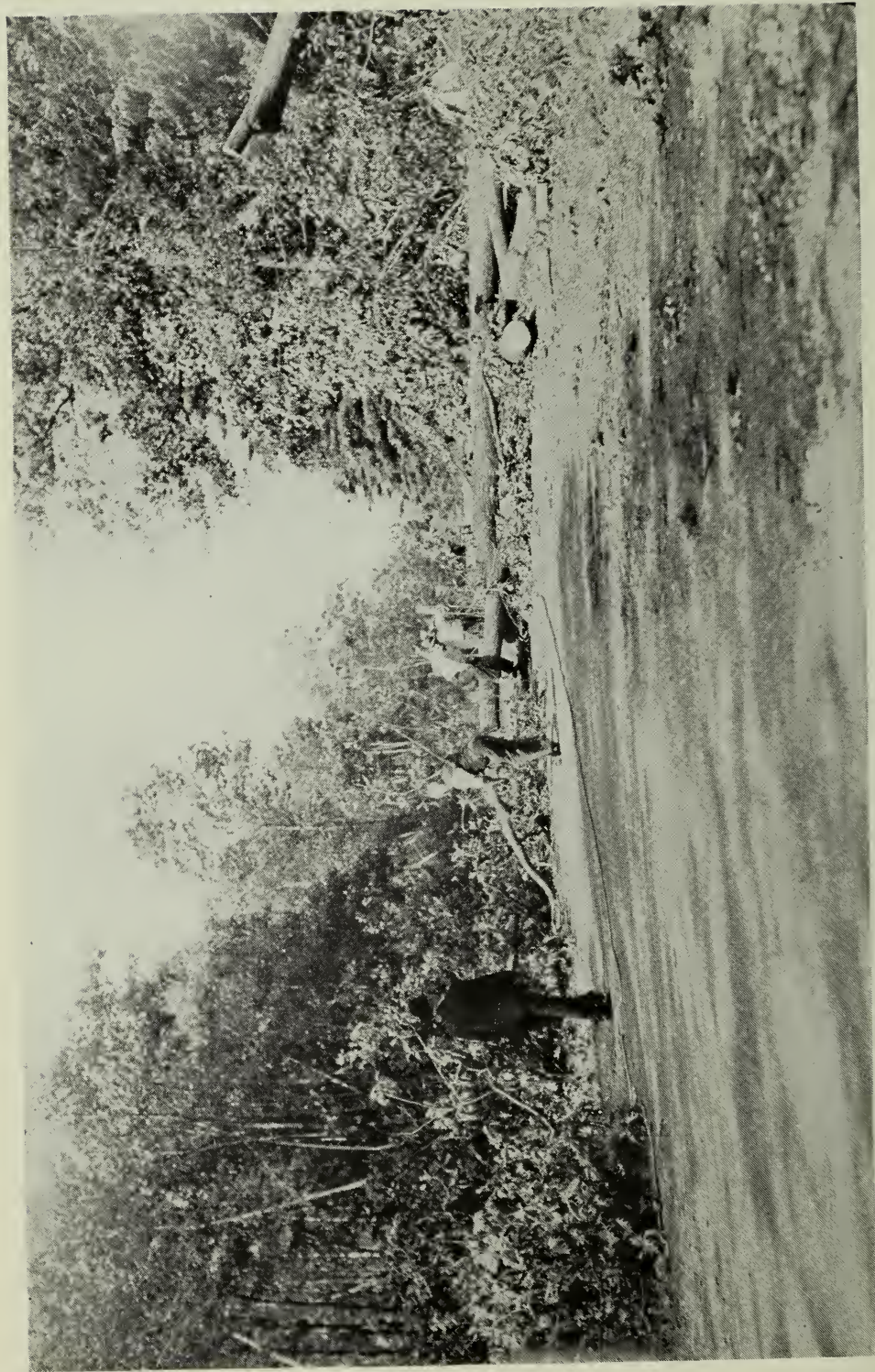
FOR THE YEAR 1938











PARKWAY THROUGH MIDDLESEX FIELDS RESERVATION, MEDFORD  
AFTER HURRICANE OF SEPTEMBER 21, 1938

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REPORT OF THE METROPOLITAN DISTRICT COMMISSION

TO THE HONORABLE THE SENATE AND HOUSE OF  
REPRESENTATIVES OF THE COMMONWEALTH OF  
MASSACHUSETTS IN GENERAL COURT ASSEMBLED.

The Metropolitan District Commission has already presented to your Honorable Body an abstract of the account of the receipts, expenditures, disbursements and liabilities of the Metropolitan District Commission for the fiscal year ending on November 30, 1938, and now, in accordance with the provisions of section 100 of chapter 92 of the General Laws, presents a detailed statement of its doings for the calendar year ending on December 31, 1938.

NINETEENTH ANNUAL REPORT

I. Organization and Administration

COMMISSION, OFFICERS AND EMPLOYEES

Joseph McKenney was appointed Associate Commissioner December 23, 1938 in place of Felix A. Marcella. The Commission with this exception remains the same as in the previous year: Eugene C. Hultman, Commissioner, William F. Rogers, Melvin B. Breath and Austin J. O'Connor, Associate Commissioners.

William E. Whittaker has continued as Secretary of the Commission. Samuel E. Killam was appointed Director and Chief Engineer of the Water Division September 5, 1938, in place of William E. Foss, who was retired. Benjamin R. Davis has continued as Director and Chief Engineer of Park Engineering and Joseph P. Dever as Director and Chief Engineer of the Sewer Division.

The total number of permanent positions as of November 30, 1938 and the number of temporary employees during the year is divided as follows:

	<i>Adminis- tration</i>	<i>Parks Division</i>	<i>Sewerage Division</i>	<i>Water Division</i>	<i>Total</i>
Permanent . . . . .	48	670	269*	376**	1363
Temporary . . . . .	27	1261	571	75***	1934
	<u>75</u>	<u>1931</u>	<u>840</u>	<u>451</u>	<u>3297</u>

\*Of this number 7 employees worked part time on Massachusetts State Project D-201, P.W.A. Docket 1419-F Sewerage Division.  
\*\*Of this number 7 employees worked part time on Massachusetts State Project D-203, P.W.A. Docket 1516-F Water Division.  
\*\*\*Of this number 2 employees worked part time on Massachusetts State Project D-203, P.W.A. Docket 1516-F Water Division.

## II. General Financial Statement

*Year ending November 30, 1938*

Expended for construction . . . . .	\$958,737.47*
Expended for maintenance . . . . .	4,379,030.56**
Expended for miscellaneous . . . . .	1,560.80
Total expenditures . . . . .	5,339,328.83
Unexpended balance, maintenance appropriations . . . . .	852,278.65
Sinking fund bonds paid . . . . .	5,050,000.00
Serial bonds and notes paid . . . . .	520,437.50
Decrease in sinking fund . . . . .	3,391,293.14
Decrease in net debt . . . . .	2,179,144.36

*On November 30, 1938*

Net debt . . . . .	12,826,760.93
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## III. Parks Division—Construction

During the year plans and specifications were prepared and construction supervised on the following work, performed by contract or by the maintenance forces of the various divisions:

### *Alewife Brook Parkway*

Ducts were furnished, cable laid and poles wired on Alewife Brook Parkway, Cambridge, between Massachusetts Avenue and the Concord Pike Circle.

### *Blue Hills Reservation*

Ordinary borrow and gravel borrow is being furnished along the length of Wampatuck Road, Quincy, in conjunction with the W.P.A. road project, which will be completed in 1939.

### *Bunker Hill Reservation*

The Northwesterly slope was regraded and the walks, curbs and drains were reconstructed at Bunker Hill Monument in Charlestown.

### *Charles River Reservation*

The draw span at the Charles River Dam, Boston and Cambridge, was repaired, a portion of the steam line between the lock wall and sluices was replaced and repairs were begun on the cement concrete walks at the dam.

The roofs and gutters at the Upper and Lower Lock Gate Houses at the Charles River Dam, Boston, were repaired, two wooden housings were built over the capstan pits and the Lower Lock Gate House and lock fences were painted.

A hot water heating system and fully automatic oil burner were installed at the headquarters building at Charles River Dam, Boston.

The stop plank house and garage at Charles River Dam, Cambridge, was completed, the driveway was graded and surfaced and all stop planks, girders and trusses were removed from the shelter and stored in the new house.

Construction was started of a boat house and recreation building between Exeter and Fairfield streets, Storrow Memorial Embankment, Boston. Work will be completed in 1939.

\*Of this amount \$7,346.65 is for Massachusetts State Project D-1 Docket Wellington Bridge.  
104.95 is for Massachusetts State Project D-206 Docket 1512-F Metropolitan Parks Construction Fund, Boulevards, Special, Underpass at Columbia Circle.

174.65 is for Massachusetts State Project D-207 Docket 1510-F Traffic Circle at West Roxbury Parkway and Centre Street.

360.51 is for Massachusetts State Project D-210 Docket 1555-F Overpass and Traffic Circle, Cottage Farm Bridge.

\*Of this amount \$277,100.09 is for Metropolitan Sewerage Construction Fund, North System. Massachusetts State Project D-101 Docket 1098-R.

11,172.55 is for Massachusetts State Project D-201 Docket 1419-F.

76.95 is for Syphon Chelsea Creek, Massachusetts State Project D-204 Docket 1574-F.

\*Of this amount \$1,864.70 is for Massachusetts State Project D-203 Docket 1516-F Metropolitan Water Construction Fund, Improvements, Supply Mains.

\*\*Of this amount \$ 113.35 is for Massachusetts State Project D-209 Docket 1585-F Metropolitan Parks Fund, Boulevards, Resurfacing Boulevards and Parkways, Traffic Circle on Revere Beach Parkway.



A sump pump was installed at the sanitary near Embankment Road, Boston and repairs were made to the cast stone coping, etc., of the service building at the corner of Embankment Road and Beaver Place, Boston.

The wearing surface and decking of the Harvard Bridge, Boston and Cambridge was repaired.

Repairs were made to the granite curbing, granolithic sidewalk and roadway surface of the Memorial Drive Underpass at Harvard Bridge, Cambridge.

Borings were taken and plans were prepared for a proposed traffic circle and overpass at the intersection of Cottage Farm Bridge and Memorial Drive, Cambridge. The proposed construction necessitated widening of the adjacent bridge over the Boston and Albany Railroad and a contract was awarded for, and work started on the widening, which is Section 1 of the project. Construction of the circle, Section 2, was advertised for bids and work on the overpass structure, Section 3, will be started early in 1939. All work is being done under P.W.A. Docket No. Mass. 1555-F, Massachusetts State Project No. D-210.

Alterations to the Magazine Beach Bathhouse were commenced and a heating system was installed at the Magazine Beach Sanitary, Memorial Drive, Cambridge. The work will be completed in 1939.

Cables were replaced and lighting ducts drained at the River Street Bridge, Boston and Cambridge and the edgestone and sidewalks at the bridge were repaired.

Two eighteen-inch reinforced concrete pipes were reconstructed in Soldiers Field Road near Western Avenue, Brighton.

A bathhouse is being constructed on the southerly side of Pleasant Street, about 700 feet east of Green Street, on the Charles River in Watertown.

Approximately 3,000 cubic yards of ordinary borrow was excavated at Norumbega Road, Weston.

Reconstruction of the tennis courts at Riverside Recreation Grounds, Weston, was started and will be completed in 1939.

#### *Lynn Fells Parkway*

Two twenty-four inch reinforced concrete pipe drains were installed, sections of head walls reconstructed and wooden sump boxes constructed on Lynn Fells Parkway at Melrose Street, Melrose.

#### *Mystic River Reservation*

The bridge over the Mystic River at Harvard Avenue, Medford and River Street, Arlington, which was authorized by Chapter 432 of the Acts of 1937, was completed and opened to traffic. The temporary bridge and approaches, for use during construction of the new bridge, were removed.

#### *Mystic Valley Parkway*

Cables were installed, poles wired and a manhole enlarged in the Mystic Valley Parkway from Mystic Avenue to Middlesex Fells Parkway, Medford.

Dredging of a portion of the Upper Mystic Lake, Winchester, was started and will be completed in 1939.

Repairs were commenced to the lock gates at Cradock Dam, Medford.

Some drainage improvements were begun and a tide gate installed at Mystic Valley Parkway, Medford.

At the Aberjona Bridge, Winchester, the fence was repaired and all steel work, including the fence, was painted.

A pipe drain was installed from Mystic Valley Parkway to the Mystic River, Somerville.

Stone and gravel ballast was placed on the shores of Lower Mystic Lake, Arlington.

The steel at the Mystic River Bridge, Medford, was painted.

#### *Nantasket Beach Reservation*

Smoke screens and handrails were installed at the Nantasket Hotel and Restaurant, Hull.

The boilers at the headquarters buildings were renewed and the sewer was replaced and extended.

The area in back of the sea wall near Otis Street, Nantasket, was filled.

### *Old Colony Parkway*

Reconstruction and repair work was started on the Neponset River Draw-bridge and the approach spans, Boston and Quincy. Work will be completed in 1939.

The draw span at the Dorchester Bay Bridge, Dorchester, was repaired.

Road improvements were begun near the underpass at Columbia Circle, Dorchester, under P.W.A. Docket No. Mass. 1512-F, Mass. State Project No. D-206. The work will be completed in 1939.

Traffic control signals, signs and lines were installed at Dorchester Bay Bridge, Boston and at Fox Point Road, Boston.

Traffic signal control equipment, of the pre-timed controlled type, was installed at the intersections of Old Colony Parkway and Redfield, Tolman and Conley Streets, Freeport Streets, north and south, Dorchester, to replace vehicular-actuated systems, which were found to be unsatisfactory.

The concrete culverts at Patten's Cove and Tenean Creek, Dorchester, were repaired.

The concrete sidewalk and curbing of the Mount Vernon Street Bridge, Dorchester, are being repaired and the work will be completed in 1939.

### *Quincy Shore Reservation*

The sea wall and steps from Herbert Road to Channing Street, Quincy, were reconstructed.

### *Revere Beach Parkway*

Work was started on miscellaneous wood and steel repairs to Malden River Bridge, Medford and Everett.

Construction was begun of a traffic circle at the intersection of Garfield Avenue and Webster Avenue, Chelsea, under P.W.A. Docket No. Mass. 1585, Mass. State Project No. D-209. The work will be completed in 1939.

Repairs were made to the Malden River Bridge, Everett.

The fence at Western Division Bridge over the Boston and Maine Railroad, Medford, was repaired.

### *Revere Beach Reservation*

A sanitary building is being constructed at Shirley Avenue, Revere. The work will be completed in 1939.

The sanitary building at Oak Island Street was completed.

Eight large pavilion shelters were repaired and painted.

### *West Roxbury Parkway*

The construction of a traffic circle at West Roxbury Parkway and Centre Street, West Roxbury District of Boston, was started under P.W.A. Docket No. Mass. 1510, Mass. State Project No. D-207. The work will be completed in 1939.

### *Winthrop Parkway*

Repairs were made to the shore protection from Endicott Avenue to Broad Sound Avenue, Revere.

### *Winthrop Shore Reservation*

The sea wall and roadway along Winthrop Shore Reservation from Moore Street to Tewksbury Street, Winthrop, was repaired.

A stone jetty was constructed off Winthrop Shore Reservation at the circle near Beacon Street, Winthrop.

## RECONSTRUCTION OF PARKWAYS AND BOULEVARDS

The following boulevards and parkways were reconstructed or resurfaced during the year, with some changes in grade and alignment:



Blue Hill Street and Hillside Street from Washington Street to the main entrance to Houghton's Pond, Canton and Milton, was reconstructed.

The easterly roadway of Fellsway East from Savin Street to Highland Avenue was reconstructed and a traffic ellipse was constructed at Highland Avenue, Middlesex Fells Parkway, Malden.

Hillcrest Parkway from near Highland Avenue to Appalachian Road, Winchester, was reconstructed.

Elm Street, Medford, Middlesex Fells Reservation, from Fellsway West to Highland Avenue, is being reconstructed. The work will be completed in 1939.

The approaches to Mystic River Bridge, Mystic Valley Parkway and a portion of Fellsway West at Brooks Road Overpass, Medford, was resurfaced.

Quincy Shore Boulevard from Furnace Brook Parkway to Sea Street, Quincy, was resurfaced.

Two hundred and fourteen permits were issued for driveway entrances and necessary purposes and fifty-four orders concerning restrictions were issued and reported upon.

The Park Engineering Department furnished the supervision for all driveway construction work, and all other work relating to permits and reported on building operations where violations of restrictions were involved.

The work of breaking ice in the channels of the Charles River Basin below Longfellow Bridge and in the Broad and Lechmere Canals was done as required by the Federal Government.

#### IV. Maintenance of Parks and Reservations

##### REVERE BEACH DIVISION

During the bathing season of 1938 there was an unusually large attendance at all the beaches in this division. The increase was due to the pollution of water at various public beaches in the vicinity of Boston and the fact that frequent tests by the State Department of Public Health did not indicate any dangerous pollution of the waters at these ocean beaches. With a total of over twenty million persons visiting the Lynn, Nahant, Revere, Swampscott and Winthrop beaches, there were no drownings during the season; a remarkable record for such intensively patronized public beaches and indicative of the safety of the beaches and the quality of lifeguard service which is maintained.

Assistance was given to the town of Nahant during the visit there of President Roosevelt, and to the City of Lynn in their observance of the 150th Anniversary of the Signing of the Constitution.

##### *Revere Beach Reservation:*

Snow fences and basin markers were erected, snow was removed and roads and walks were sanded when necessary.

Parking lines and cross walks were painted.

All life saving apparatus was repaired and painted and three life boat trailers were constructed in the division's shops.

The interior and exterior of the headquarters building was painted.

Thirty-five open shelters and eight public sanitaries were painted.

New floors were installed in the guard room of the police station and in the bath house laundry.

Catch basins were cleaned and sewers dragged and flushed.

Roads and walks were repaired and kept clean.

Debris was removed daily from the beach during the summer season.

500 square yards of Type "I" pavement walks were constructed.

A 600-gallon hot water tank was installed.

The brick work on the headquarters building was pointed.

A new drinking bubbler and leaching basin, four man holes, electric service and water service, were installed at the new sanitary at Oak Island and fill and rip rap protection was placed at the boat ramp.

Trucks, automobiles, power and hand mowers, tractors, compressor, concrete mixer and other machinery repairs were made in the shops.

The old bandstand at Revere Street, was demolished.

All rule, regulatory and directional signs were repainted and some reflex signs were made and set out.

Extensive concrete pointing and patching was done to sea walls and concrete curbs and walks.

Concrete settee posts, sign posts and guard rail posts were cast.

Fire prevention service hose and boxes were installed on the exterior of the labor shops and new extinguishers were installed where needed in the interior of buildings.

Obsolete and defective electric wiring was removed from the headquarters building and new work was installed.

Twenty concrete bound posts were set.

6,000 square feet of lawn was regraded and seeded.

#### *Revere Beach Parkway:*

Roads, walks, catch basins and sewers were cleaned and kept in repair. Snow was plowed and roads and walks were sanded.

Trees and shrubs were sprayed, pruned and fertilized. Grass was cut and snow fences and basin markers were erected.

All signs, fences and traffic lines were painted. Life saving equipment was maintained.

A grass area and shrub bed was constructed at Second Street, Everett.

16 acres of roadside at Revere Beach Parkway Overpass, Chelsea, was regraded, loamed, fertilized and seeded.

400 plants, 500 bulbs, 500 shrubs and 105 trees were set out.

170 square yards of Type "I" pavement walks were constructed.

250 concrete guard posts were installed.

5,000 feet of obsolete and disused fencing and wood posts were removed.

New reflex directional and regulatory signs were erected.

#### *Lynnway:*

Roads, walks and catch basins were cleaned, trees and shrubs were sprayed, pruned and fertilized, grass was cut, signs were erected, fences were painted, snow plowed and the roads sanded.

A shrub bed was constructed and 400 shrubs were set out.

740 square yards of Type "I" pavement walks and 335 square yards of granolithic walks were constructed.

#### *Lynn Shore Reservation:*

Regular maintenance was provided, such as the removal of debris from the beaches, roads and walks; sea wall, sidewalk and road repairs; cleaning of catch basins and sewer lines; erection of snow fences and basin markers; snow removal and road sanding, spraying, fertilizing, pruning of shrubs and trees and cutting of grass.

Rail and wood fences, shelters and traffic lines were painted.

44 18-foot American Linden trees, 200 shrubs and 700 bulbs were planted.

Life saving equipment was kept in repair and readily accessible for emergency use.

#### *Nahant Beach Parkway:*

Roads, walks and catch basins were cleaned, trees and shrubs were sprayed, pruned, fertilized, grass was cut, signs were set out, snow was plowed and walks and roads were sanded.

Fences, shelters, the sanitary, playground equipment and bleachers were painted.

The baseball and football fields, tennis courts and skating rink were maintained.

Traffic lines and signs were repainted. Repairs were made to sea walls, walks, roads and auto parks.

Snow fences and basin markers were erected.



Fireplaces and drinking bubblers were kept in repair.

Storm shutters were installed on the refectory.

70 settees were erected on the promenade.

4,400 square yards of Type "I" pavement walks were constructed and 130 square yards of concrete floor was laid in the men's bath house yard.

600 linear feet of solid storm fence was erected at the auto park at the rear of the refectory.

Life saving equipment was maintained.

A shower was installed in the police station and all cell locks were repaired.

#### *Winthrop Parkway:*

Debris was removed from the beach, roads and walks. Snow was cleared and roads were sanded.

Sea wall, walks, roads and fences were repaired.

Trees and shrubs were sprayed, pruned and fertilized, grass was cut, fences painted and catch basins cleaned.

300 linear feet of concrete sea wall was constructed.

A shrub bed was constructed and 200 shrubs were set out.

#### *Winthrop Shore Reservation:*

24 stairs, giving access to the beach, were set out in the spring and removed in the fall.

Snow was removed, roads were sanded, roads and walks were patched, shrubs were sprayed and pruned, grass was cut and traffic lines were painted.

Life saving equipment was maintained.

The old pier at Fort Heath was removed.

### MIDDLESEX FELS DIVISION

#### *Middlesex Fells Reservation:*

The bridle paths were kept in good repair, recreation grounds and parking spaces were kept free of debris; wood was supplied for the fireplaces at the Sheepfold. The regrading of Whitmore Brook Road and repairing of the drains was completed. Drains were laid across the new road to the top of Pine Hill. The construction of a log cabin in the Virginia Woods section by the Malden Girl Scouts was completed. This cabin is for the exclusive use of the Malden Council of Girl Scouts who will maintain the building.

From the reservation nursery, 409 evergreens, 1,795 shrubs and vines, 282 trees and 1,860 plants were sent to other divisions for roadside and reservation planting. 12,000 hemlocks, 10,000 white pines and 10,000 red pines were planted in this division during the year.

#### *Breakheart Reservation:*

The house and barn on this reservation which are the property of the Commonwealth have been repaired as needed by divisional workmen. The care of the reservation is still in the hands of the C.C.C. Signs, life boats and life saving equipment was furnished where necessary.

#### *Mystic River Reservation:*

The mosquito control ditches on the marsh were kept clear. The State Department of Public Health declared the water at the bathing beach at Foster's Court in Medford to be polluted and banned bathing, thereby causing the bathhouse to be closed. Grass areas were cut and raked and debris was removed from beach and recreation grounds.

#### *Alewife Brook Parkway:*

Grass was cut, shrubs pruned and catch basins and gutters cleaned. Traffic lines and warning signs were painted on the roadway. Fences were painted and repaired as needed. Snow was plowed and removed from roadways and sidewalks when necessary and roads and sidewalks were sanded in icy weather.

*Lynn Fells Parkway:*

Grass plots and ribbon strips were kept cut and raked, catch basins and gutters were cleaned, culverts and cross drains were cleaned and repaired; sidewalks were graded and kept in good repair. Sidewalks from West Emerson Street to Charles Street on both sides were resurfaced. Snow was plowed and removed from the roadways and sidewalks and parkway was sanded when necessary.

*Middlesex Fells Parkway:*

Fences were repaired and painted, traffic lines, cross-walks and warning signs were painted on the roadways. Grass plots and ribbon strips were cut and raked; catch basins and gutters were cleaned. Snow was plowed and removed from roadways and sidewalks and they were sanded when found necessary.

*Middlesex Fells Roads:*

Fences were repaired and painted; culverts and cross drains were repaired and kept in good condition; catch basins and gutters were cleaned; traffic lines, cross-walks and warning signs were painted on roads where needed. Roadways and sidewalks were kept in good repair. Snow was plowed from roadways and sidewalks and they were sanded when found necessary.

*Mystic Valley Parkway:*

Fences were repaired and painted; traffic lines, cross-walks and warning signs were painted on roadways. Grass plots and ribbon strips cut and raked. Shrubbery beds were pruned and cultivated. Beaches and recreation grounds were kept clean; gutters and catch basins were cleaned; drains repaired; sidewalks graded and kept in good repair. Snow and ice were removed when necessary.

*Quannapowitt Parkway:*

Roadway and bathing beach were kept clean and repairs were made when necessary.

*Woburn Parkway:*

Broken fences were repaired and all fences were painted; the grass was cut; shrubs were trimmed and the roadway repaired where necessary. Snow was plowed and the roadway sanded as necessary.

*Forestry:*

The main efforts of this department during the year were directed towards the control of the severe infestation of the gypsy moth. Detailed reports have been made of these activities so that only a general summary is necessary at this time. During the winter of 1938 creosoting operations were performed and continued until early April. The entire infested area within the reservation was treated.

Brush was cut and burned and low and dead limbs were removed in an area of some four to five hundred acres, thus further reducing the gypsy moth infestation and making the area more accessible for spraying operations.

During the spraying season the first spraying machine commenced work on May 2nd and the work was continued until July 7th. One sprayer was in use at Breakheart Reservation for five weeks. At the height of the spraying period one six hundred-gallon, one three hundred-gallon, and three four hundred-gallon sprayers were in use in the field.

A total of eighteen tons of arsenate of lead and five hundred and fifty gallons of fish oil were used. Approximately twelve hundred and fifty acres of woodland were thoroughly sprayed. Also both sides of all accessible bridle paths and fifty percent of them twice, as well as all boulevards and parkways and the entire Mystic River and Alewife Brook reservations, including the area around Little Spy Pond, Belmont, were sprayed.



Creosoting work was again started in the middle of October, 1938, and will be continued as during the winter of 1937-1938.

Regular maintenance work was carried on by the permanent personnel of the Forestry Division, such as clearing bridle paths of low and dangerous limbs, cutting brush on the roadsides, dangerous corners, etc., and also the removing of dead or dangerous trees both on the boulevards and within the wooded areas.

The entire police signal system was gone over during the summer of 1938 and interfering limbs and other obstructions were removed. Further trimming of dead limbs, etc., was carried on in the various picnic areas, especially in the vicinity of Crystal Spring. Several weeks were spent in trimming the trees on the Mystic Valley Parkway.

All of the smaller trees on the boulevards were restaked and this work checked at intervals during the season. These trees were also dug around to facilitate the proper access of water and air. In locations where some of these trees had died or been injured, replacements of a like kind were made.

In various locations within the reservation underplants were made. These totaled 10,000 Red Pine, 10,000 White Spruce and 12,000 Hemlocks.

Due to the very heavy rains and a continued moist year the number of brush fires was at a minimum and did not total over ten, none of which covered an area of any considerable size. This reservation was very fortunate in experiencing only one fire since the hurricane of September and this covered only an area of approximately one acre.

Co-operation was given to, and received from, Superintendent Hatch of the Breakheart Reservation C.C.C. camp in Saugus. Arsenate of lead, fish oil, creosote, poles, brushes, etc., were furnished to him for use in the control of gypsy moths within the reservation.

Much of the work carried on during the past season and proposed future plans were nullified by the September hurricane. Since this disastrous storm the work of this department has been in the nature of hurricane reconstruction and rehabilitation.

### MIDDLESEX FELS ZOO

The Zoo, located on Pond Street, Stoneham, adjacent to Spot Pond in the Middlesex Fells Reservation, continues to be a great attraction for visitors of all ages, with thousands being present each Sunday and a smaller attendance on week days. The Zoo has been fortunate in the successful propagation of animals which rarely reproduce in captivity. The new-born and young of all species are a constant source of interest and amusement to all visitors. The inventory of all animals, birds and reptiles at the end of 1938 is as follows:

#### *Animals:*

6 Fallow Deer, 3 Siki Deer, 4 Elk, 1 Buffalo, 2 Ponies, 2 Steer, 2 Aoudad, 3 Tahr, 2 Llamas, 8 Sheep, 8 Goats, 4 Peccaries, 3 Black Bear, 3 Wolves, 9 Red Fox, 2 Gray Fox, 6 Raccoons, 2 Oppossum, 1 Coaiti, 3 Woodchucks, 2 Porcupine, 1 Mink, 1 Fox Squirrel, 10 Gray Squirrels, 1 Skunk, 2 Mountain Lions, 4 African Lions, 4 Jaguars, 1 Ocelot, 1 Wildcat, 2 Kinkajou, 1 Borneo Baboon, 4 Rheasus Monkeys, 2 Java Monkeys, 1 Vervet Monkey, 1 Ringtail Monkey, 1 Mangabey Monkey, 10 Rabbits, 20 Guinea Pigs.

#### *Birds:*

8 Blue Peafowl, 6 White Peafowl, 4 Black-shouldered Peafowl, 1 Bald Eagle, 2 Golden Eagle, 1 Sharpshin Hawk, 2 Great Horned Owls, 4 Macaws, 1 Cockatoo, 5 Parrots, 10 Egyptian Geese, 6 Canada Geese, 3 Blue Geese, 2 Snow Geese, 2 White-fronted Geese, 1 China Goose, 3 Toulouse Geese, 1 Gannet, 1 Black-crowned Night Heron, 8 Black Ducks, 10 Wood Ducks, 4 Mandarin Ducks, 2 Rosy-billed Ducks, 4 Pintailed Ducks, 1 Gadwall Duck, 2 East India Ducks, 2 Buff-crested Ducks, 8 White-crested Ducks, 2 Rouen Ducks, 16 Pekin Ducks, 30 Mallard Ducks, 10 White Mallard Ducks, 35 Muscovy Ducks, 15 Mixed Ducks, 3 Swans, 1 Japanese Teal, 3 Sea Gulls, 12 Bob White Quail, 6 California

Valley Quail, 4 Guinea Fowl, 4 Golden Pheasants, 3 Swinehoe Pheasants, 4 Reeves Pheasants, 3 Melenotus Pheasants, 3 White Pheasants, 2 Manchurian Pheasants, 2 Versi-colored Pheasants, 4 Silver Pheasants, 3 Formosan Pheasants, 2 Ring-necked Pheasants, 4 Lady Amherst Pheasants, 4 Black-throated Golden Pheasants, 1 Mutant Pheasant, 40 pairs of Pigeons.

*Reptiles, etc.:*

1 Rattlesnake, 2 Iguana, 12 Alligators, 2 Box Turtles, 6 Gold Fish.

*Died During 1938:*

1 Monkey, 1 Otter, 1 Mongoose, 1 Rattlesnake, 1 Badger, 3 Fox, 2 Peafowl.

*Born During 1938:*

4 African Lions, 4 Jaguars, 1 Tahr, 2 Fallow Deer, 1 Siki Deer, 6 Goats, 4 Sheep, 1 Wolf.

*Received as Gifts in 1938:*

4 Red Fox, 6 Bob White Quail, 4 Monkeys, 7 Raccoons, 2 Parrots, 2 Iguana, 1 Gannet.

*Received in Trade in 1938:*

1 Mountain Lion, 1 Wild Cat, 2 Aoudad, 1 Gray Fox.

*Disposed of in Trade in 1938:*

3 Mountain Lions, 1 Peccary, 3 Monkeys, 2 Jaguars, 28 Peafowl, 4 Red Fox, 4 Raccoons, 6 Goats.

Two new cages were constructed inside the monkey house and one outside cage for the African Lions. A new yard and rockery for the Aoudad was also built.

## CHARLES RIVER LOWER BASIN DIVISION

*General Office:*

This division, being the nearest to the headquarters building at 20 Somerset Street, Boston, supplied trucks and labor for the hauling of supplies for all departments from the State House, removal of snow from the headquarters yard and furnished sand and salt as needed for sidewalk care. Also, miscellaneous carpentry work and painting was done.

Police uniforms were distributed from this office and truck and labor service was furnished the Lock and Draw Bridge Department for the removal of ashes and rubbish.

All roads, walks, intersections and bridges in the division were plowed and sanded when necessary. Two thousand feet of snow fence was erected and removed from points on the Boston and Cambridge sides of the Charles River.

All trees and shrubs in the reservation were sprayed several times during the year to safeguard against all kinds of insects.

*Storrow Memorial Embankment and Charles River Basin:*

The main floor of the police station, comprising the guard room, booking room, stairways, halls and the Captain's, Lieutenant's and Sergeant's rooms, were repainted and the ceilings whitened. More space was given to the booking room by moving the booking desk forward. New wiring and lighting fixtures were installed, replacing equipment which had become obsolete. Considerable repairs were made to the plumbing in the station.

The garage at Commercial Avenue was improved by the installation of new lighting fixtures including outside floodlights for night work in the garage yard. The loft of the garage, which is used by the police department as a shooting gallery was improved extensively, with alterations being made to heating, lighting and ventilating.



At the boathouse, the lighting system was thoroughly overhauled and some new equipment added. All the flat-bottom life boats were overhauled, caulked and painted. The police boat engines were overhauled during the winter and the boats caulked and painted. Two new engines were purchased for the police boats to replace the ones in M.D.C. No. 1 and M.D.C. No. 2 and were installed in the boats in April and May.

A bubbler drinking fountain at the West Boston Bridge was replaced with a new one and the supply pipes were replaced. A concrete platform about one hundred feet square was placed around the new fountain. A drain near the same location was dug up and replaced.

A four-inch water supply which runs along the whole Boston Embankment was repaired several times with new lengths of pipe.

The gravel walks between Harvard Bridge and the Cottage Farm Bridge were resurfaced and rolled.

A temporary house was erected for the use of the skaters at the Lagoon and was removed in the spring. The building was repainted and the floor was repaired. A dozen benches were made for the skaters. The ice at the Lagoon was kept cleaned of snow and was planed and sprinkled when needed.

During the summer a W.P.A. project, under the State Department of Public Health, surveyed the depth of the basin and the Lagoon and a blue print showing the depths of the water has been sent to the Commission with recommendations in regard to filling in the same to a more reasonable depth.

About two thousand square feet of concrete sidewalks were repaired and the walks in this area were sanded when necessary during the winter and kept swept in the summer.

Floats were provided and areas were roped off for the outboard motor races in August. A large amount of roping off was done for the Santa Son Parade in November.

The tea-house was repaired and the floors oiled and the plumbing overhauled.

The grass was cut every five days and the other usual maintenance work was carried on. The shrubs were pruned during the winter and over a thousand new shrubs were planted in the spring.

The shell concerts were held as usual and considerable time was spent on the area near the shell in cleaning the grounds and in watering the grass and shrubs.

#### *Bunker Hill Reservation:*

The entire interior of the lodge room, rest rooms, entrance hall and reception hall were redecorated. In preparation for this redecoration considerable repair work on the plastering, windows, window frames and tile work was done by division forces. The radiators were refinished and several new main valves were installed. The plumbing in the building was overhauled as much as practicable.

A portable storm shelter for the entrance to the lodge room was installed and painted. The iron shutters in the monument which had become unsafe, were repaired and put in good condition. New bubbler fountains were installed and necessary repairs to the toilets were made.

The lighting system in the monument was overhauled and the conduit repainted up to the top of the monument.

The flagpoles were repainted and new halliards were installed and old flags replaced.

The display of relics in the lodge room was improved with the placing of new plates and markers, some of the old ones having become unreadable.

The reservation grounds were greatly improved by extensive alterations which included regrading, changes in the drainage system, construction of new paths and walks, resurfacing of old walks, reconstruction of a retaining wall, etc.

The bankings were loamed and seeded in the spring. The gravel walks were resurfaced and brought to grade. Catch basins were cleaned and gutters repaired. The settees were all repainted and were repaired where necessary. Considerable attention was given to the floodlights which are at present unsatisfactory and which we hope to replace next year.

During the year 26,915 visitors paid \$2,691.50 as admission fees to enter the monument.

#### *Cambridge Parkway and Memorial Drive:*

The usual maintenance work was carried on. The grass areas were cut every five days, the roadway and park areas were cleaned daily of papers, etc., and the gutters cleaned as needed. The traffic lines were kept painted and the curbs at intersections and curves were painted white. The police boxes were all painted according to specifications and about 1,000 feet of police cable was laid. 200 new signs were made and lettered. New street barricades were made for use at the football games. Two new drinking fountains were installed on Memorial Drive and about 1,000 feet of inch and a quarter pipe was laid to supply the water. A new float for use at the public landing was built and placed. The other floats were overhauled and repaired, put in place in the spring and removed in the fall.

A new float was also made and machinery installed on it, for use in spraying the river with Hypochloride, in conjunction with the State Department of Public Health. All the beaches in the basin, including those under the control of the cities, West Boston Beach and Gerry's Landing Beach, were sprayed from the float, which was towed about the basin by a police boat.

All wooden fences were painted and repaired and about fifteen benches were made for the tennis courts. The tennis courts were kept in good repair, the fences were repaired and the lines on the courts were kept well marked.

Two new catch basin frames and covers were built. Four hundred shrubs were moved from the site of the R. H. White Moto Homes and were planted in various parts of the reservation. Eight hundred additional trees and shrubs were planted and a large number of trees which did not show proper growth, were fertilized. Over one thousand yards of loam was used in grading the ball grounds and in making tree pits and shrub beds.

The roadways were kept in constant repair and the river bank kept clear of rubbish. Traffic signals and beacons were kept in order and all life-saving equipment kept repaired and in place.

#### *Fresh Pond Parkway:*

A new bubbler fountain was installed at Lowell Park. About one hundred feet of supply pipe was used. The sidewalks were repaired with gravel and stone dust, the roadway was kept in repair, traffic lines were kept painted and gutters and catch basins were kept clean. A plank walk, used as a path through Lowell Park, was repaired and reset in the late fall. Two hundred new shrubs and thirty trees were planted in this area.

#### *Magazine Beach:*

The bathhouse at Magazine Beach was entirely remodelled, the outside being finished in a very pleasing stucco finish. New plumbing and new lockers were installed in the interior and new concrete floors laid in the yards. New sodded lawns were established on all sides of the bathhouse. Several new settees were installed at the edge of the new lawn and all old settees were repaired, repainted and reset. The beach was covered with a new layer of two hundred tons of clean sand. The safety buoys for the swimming area were painted and set in place. A four-inch water supply to the Magazine Beach comfort station was repaired by the installation of two new lengths of pipe.

### CHARLES RIVER UPPER DIVISION

#### *Charles River Reservation:*

During the winter season, roads and walks were kept clear of snow and sanded when required. Gutters and catch basins were kept clear, roads were patched and kept in repair and traffic lines were painted. Floats were repaired and renewed where required and life-saving stands were kept in repair and



properly equipped. Fences and signs were kept in repair and painted. All buildings on the reservation were repaired and painted when necessary. The band stand at Watertown was repaired and painted two coats. Trees were pruned, dead and worthless trees were removed, shrub beds were tended, gypsy moth nests were creosoted and all trees were sprayed with arsenate of lead.

Speedway track was kept in condition and well attended matinees and horse shows were held by the Metropolitan Driving Club during the winter, spring and fall.

A new furnace was installed in the dwelling house at 39 Ellis Street, Newton Upper Falls.

During the spring, 300 trees were planted along the parkways and 45 in wooded areas. 200 plants and 1,000 shrubs were planted in the reservations.

A bridle path approximately two miles long was constructed along the Wellesley side of the Charles River from Newton Upper Falls towards Riverside Public Golf Course. A retaining wall 467 feet long was built along the banks of the Charles River from Riverside Headquarters to the Norumbega Boat House. 145 lineal feet of 4-foot chain link fence was installed at the corner of Market Street and Leo M. Birmingham Parkway. 1,600 square feet of chain link fence along Soldiers Field Road from Cambridge Street to Cottage Farm Bridge, was cleaned of rust and painted. 10 acres of park land was loamed and seeded.

#### *Beaver Brook Reservation:*

In addition to the usual maintenance of grounds, trees, shrubs, etc., the following extra work was performed:

The dwelling house was shingled and painted and a new heating system was installed.

The band stand was repaired and given two coats of paint.

Several large picnic parties visited the grounds during the summer.

The public sanitary was rewired to conform with requirements of the Belmont wire inspector.

A toboggan slide was erected at the picnic grounds.

A matron was on duty at the public sanitary from May through September.

#### *Hammond Pond Parkway:*

The parkway was kept clear of snow and sanded when required. Ditches were cleaned out. Traffic lanes were painted for four lanes. Grass was kept trimmed. Trees were pruned and worthless trees removed. Underbrush and weeds were cut and cleaned up. Poison Ivy was removed. Gypsy moth nests were destroyed and trees sprayed with arsenate of lead.

Fire breaks and property lines between parkway and abutting estates in Lost Pond section were cut out and cleaned.

A building of wooden construction approximately 16 feet long, 12 feet wide and 12 feet high was erected.

#### *Riverside Public Golf Links:*

In addition to the general maintenance of buildings and the playing course, the following extra work was done.

A new irrigation system was installed in nine fairways, tees and greens on the Weston side of the river. At No. 10 hole, a new tee was constructed and the fairway was widened and graded. 200 pine trees were set out around the course.

After the hurricane of September 21st, destroyed trees and debris were quickly cleared away so that the course could be used for play. Two damaged trees were resodded and flood damaged greens and fairways were repaired.

#### *Riverside Recreation Grounds:*

Buildings were kept in repair. Approximately 800 square feet of roof on the canoe house was recovered. The pool was pumped out, washed and refilled as required during the swimming season. Grass, brush and weeds were cut and

cleared up and shrubby beds were cared for. Trees were pruned and dead and worthless ones removed. The ball field and track were kept in condition. Fences and signs were repaired and painted.

## BLUE HILLS DIVISION

### *Blue Hills Reservation:*

In addition to the regular upkeep and care of the various bridle paths, roads, buildings, grounds, trees, shrubs, plants, sidewalks, catch basins, rolling stock, equipment, etc., the following new work was accomplished:

A new nursery, 250 feet by 600 feet, was developed on the Hemenway property, near Canton Street, Canton, to be used for the storage and development of seedling forest stock. Material set out in the nursery comprised 15,000 hemlocks, 47,000 Norway spruce and 2,500 larch, all of which were secured from the State College at Amherst and from Bridgewater.

1,500 acres of woodland was sprayed using 15 tons of arsenate of lead and 500 gallons of fish oil.

At Hoosicwhisick Pond, a new parking area was constructed in which 2,000 cubic yards of gravel was spread and about 2,000 square yards of land were reclaimed and graded. 450 Japanese barberry plants were set out near the parking space.

1,800 cubic yards of gravel were used to construct a parking area in front of the garage at headquarters. Three bituminous surface driveways were constructed leading off from Blue Hill River Road and 48 Red Twig Dogwood were set out along the road. 500 cubic yards of material were removed from the sumphole near the pump house at Ponkapoag Public Golf Course and 300 tons of bituminous concrete surface was applied to the parking space near Washington Street.

### *Neponset River Reservation:*

In addition to the numberless items of regular maintenance, the following new work was performed:

A small playground covering about 2 acres, to be used by women and children, was constructed near Central Avenue off River Street. 275 linear feet of edge-stone was installed along the banks of the Neponset River near River Street, Mattapan. The adjacent area was improved and loamed and 12 maple shade trees were planted.

### *Quincy Shore Reservation:*

In addition to regular maintenance, all trees along the driveway were sprayed with arsenate of lead and fish oil and 10 Norway maples were set out between Black Creek Bridge and Sea Street.

### *Stony Brook Reservation:*

The usual care and maintenance was given to the reservation. The entire area was covered in creosote for gypsy moth egg clusters and 300 acres of woodland was sprayed with arsenate of lead and fish oil, 3½ tons of lead and 65 gallons of oil being used. 4,000 Norway spruce were set out in various locations as replacements for trees destroyed in the fire of 1937.

### *Blue Hills Parkway:*

In addition to the regular work, the easterly grass plot was reloamed, graded and seeded from Mattapan bridge to Catherine Street. The concrete walk on both sides of the parkway was repaired where the growth of tree roots had heaved the walk and made it dangerous. All trees were sprayed.

### *Dedham Parkway:*

The parkway was maintained, 600 gallons of bituminous material and 200 tons of crushed stone were applied as a seal coat, a catch basin was constructed



at the junction of Harding Terrace and the parkway, and all trees on the parkway were sprayed.

*Furnace Brook Parkway:*

In addition to regular maintenance, new work comprised the repair of gravel walks between Milton and Copeland Streets, the setting of 18 gulden willows between Newport Avenue and Adams Street, the installation of two manholes and 150 feet of 18-inch drain at the railroad bridge near Newport Avenue and the spraying of all trees on the parkway.

*Neponset Valley Parkway:*

The parkway was cared for, 8 red oaks, 4 maples and 2 American elms were replaced; several shrubs were planted in the vicinity of Paul's Bridge and Blue Hill Avenue and all trees along the parkway were sprayed with arsenate of lead and fish oil.

*Old Colony Parkway:*

In addition to the regular care and control of this parkway, as well as work incidental to the maintenance of Malibu Beach Bathhouse and beaches on both sides of the parkway, the following new work was accomplished:

40 Norway maple trees were replaced and all trees on the parkway were sprayed. 750 linear feet of service road was constructed on the easterly side of Columbia Circle from the parkway to Half Mile Road. 2 Reflector button signs were erected near Old Colony Terrace. 2 illuminated signs were installed at the parking space near the bath house, traffic lines were painted in the entire parking space and a wire fence was erected along the north side of the area.

*Turtle Pond Parkway:*

The parkway was given the usual care, two defective 8-inch drains across the parkway were replaced and all trees were sprayed.

*Veterans of Foreign Wars Parkway:*

In addition to the regular maintenance work, all trees and shrubs were sprayed, 60 trees were set out as replacements, new sewer connections were made from the Havey Beach Bathhouse, new toilet facilities were installed in the rear of the bathhouse to permit public access without having to pass through the bathhouse where an entrance fee is charged, and 40 shrubs were set out around the sub-station and bathhouse.

*West Roxbury Parkway:*

In addition to the care of roads, sidewalks, trees, shrubs, catch basins, etc., new improvements were made as follows:

Nine new catch basins were installed on East Border Road. 500 trees, shrubs and plants were set out along the parkway. Penetrating road oil was applied to road leading to Bellevue Hill Tower and to the adjacent parking space. All trees along the parkway were sprayed with arsenate of lead and fish oil.

NANTASKET BEACH DIVISION

The street, catch basins, beach, piazzas were kept clean. Lawns, shrubbery, sanitariums, building, automobiles, heaters, etc., were cared for. All fire hose was tested and repaired and 57 extinguishers were kept charged and in place. Snow fences were erected and taken down and snow was plowed and removed. Beach chair houses, stairs to beach, life boats, life preserver stands, life guard towers, hedge shutters, iron fence along the seawall, all street lamp posts, parking yard posts and hydrants, street lines and curb markings were painted. All signs used on the reservation were repainted and lettered. Beach chair houses were set

out and taken in. A new life guard stand was erected near Water Street. A fence was built in the parking yard at Water Street. A brick wall at the tar yard was rebuilt. Parking areas were oiled and sanded. At the north parking yard, 346 cubic yards of gravel was spread and 471 linear feet of concrete curb and 652 square yards of concrete sidewalk was constructed. A new parking space, having an area of 14,994 square yards of reinforced concrete steps was built, an area of 2,184 square yards in back of the seawall was filled with sand from the beach, the work being done by contract.

New concrete coping was placed on sections of the bathhouse wall and on the tar yard wall. Repairs were made to locker doors, laundry tubs and plumbing in the bathhouse and lockers, trim, copings, handrails and flagpoles were painted. The bathhouse spa was painted.

At the police station a new floor was laid in the clerk's office, hot and cold water pipes were repaired and some replacements were made; walls and ceiling were washed, painted and kalsomined. Furniture in the dormitory was repaired and refinished, the kitchen and hallway were repainted and an oil burner was installed.

Two hundred linear feet of concrete curb was set in back of the waiting room and a new concrete walk was laid to the women's sanitary near the waiting room. Tile was installed in the bath room of the Captain's quarters, the hot and cold water pipes were replaced in both the waiting room and Captain's quarters, a new hot water heater was set up in the waiting room and considerable painting work was done in both parts of the building.

Old trusses were removed from a section of the pavilion and replaced with 8 new trusses of 26-foot span and 3 new trusses of 22-foot span. 11 new piers and 6 supporting columns were also constructed. A section of floor girts were replaced and the floor was repaired and renewed. New skylights were installed and new shutters were built for the north end of the pavilion. The interior and new shutters were painted.

At the cafe, some floor girts were replaced; sections of flooring were renewed, part of the kitchen roof was resurfaced, new sash and frames were installed and the easterly side was reshingled; miscellaneous carpentry, electrical and plumbing work was performed; a new shower bath was installed, interior and exterior window trim, bedrooms, dining room and all new woodwork was painted and the ceilings in the kitchen and dining room were whitened.

New columns were erected on the hotel piazza. The corner post, boarding, clapboards and roof girt at the southeast corner of the hotel were replaced from the sill to the first bedroom floor. Exterior siding and trim were repaired and all walls were painted. A new partition, shelves and screen door were erected in the barber shop. A drain was installed for the new hotel bar. The hotel lobby, office, reception room, shower baths, barber shop and corridors were repainted. Fire screen partitions were built at all stairways in the hotel and cafe and the second floor well over the hotel lobby was closed.

The piazza on the south side of the Tivoli sanitary was rebuilt. Windows, locks and doors in the hotel, cafe and pavilion were repaired. Hotel and cafe piazza were repaired. The water pipe from the archway to the pavilion lunch room was renewed. The plumbing in all buildings was checked over and replacements made where required. The interiors of all sanitariums were repainted. Tivoli Shelter and the stands, posts, clapboards and trim in the archway were painted. Plastered walls in the cafe kitchen and hotel and cafe bedrooms were repaired. Electrical wiring in sections of the hotel piazzas, pavilion and Tivoli Shelter were renewed.

#### BATH HOUSES

The bath houses and beaches under the jurisdiction of the commission were open each day from July 1 to September 5, 1938, with all bathhouses being opened on the warmer days between June 12 and July 1, 1938.



The attendance and receipts for the bathing season of 1938 at the bath-houses at which fees are charged were as follows:

							<i>Number of Bathers</i>	<i>Receipts</i>
Nantasket Beach	..	..	..	..	..	..	77,213	\$16,975.40
Revere Beach	..	..	..	..	..	..	57,251	12,643.10
Nahant Beach	..	..	..	..	..	..	14,661	3,434.10
Malibu Beach	..	..	..	..	..	..	13,449	1,344.90
Hoosicwhisick Pond	..	..	..	..	..	..	2,246	224.60
Magazine Beach	..	..	..	..	..	..	2,127	164.35
Havey Beach	..	..	..	..	..	..	805	80.50

Other bath houses are maintained at the following locations on a free basis:

Mystic River, Medford—Foster's Court  
 Upper Mystic Lake, Winchester—Sandy Beach  
 Charles River Reservation, Brighton—Brighton  
 Charles River Reservation, Brighton—Faneuil

The bath houses and beaches at Foster's Court and Sandy Beach were closed for the second season because of pollution of the water, due to the overflow of sewerage from surcharged sewer mains into the Mystic and Aberjona rivers.

The bath house which is now being constructed on the Charles River at Watertown will be completed in the early spring and opened to the public for the 1939 bathing season.

#### GOLF COURSES

Riverside Public Golf Course in Weston and Ponkapoag Public Golf Course in Canton were open from early April to November 30, 1938. The number of \$20.00 season memberships sold at each course was larger than during the 1937 season, with 539 being sold at Ponkapoag and 330 at Riverside. The gross receipts at Ponkapoag were \$19,463.97 and at Riverside \$16,132.30. A total of 35,000 rounds were played at Ponkapoag and 16,877 at Riverside.

Both courses were given regular maintenance and some improvements were made at both. Work on the construction of the nine additional holes at Ponkapoag progressed well during the year. A new W.P.A. project was approved and work started on the installation of a complete fairway and greens watering system for the complete course of 27 holes at Ponkapoag.

#### BAND CONCERTS

A Legislative appropriation of \$20,000 was made to the Metropolitan District Commission to provide for the playing of band concerts in the Metropolitan Parks District. \$19,991.31 was paid to 71 different bands for playing 49 afternoon concerts at 10 locations, 22 evening concerts at 7 locations, afternoon and evening concerts on 25 days at 2 locations; a total of 121 concerts played at 19 locations. An estimated total of 162,000 people attended the concerts in addition to hundreds of thousands of persons who were at Nantasket Beach where afternoon and evening concerts were played by selected bands on each of 24 days during the bathing season, at Revere Beach where 10 afternoon concerts were given, at Nahant Beach where 10 afternoon concerts were played and at Bunker Hill Monument where an evening concert was given on the 17th of June. Bids for concert work were received from 112 bands in the Metropolitan Parks District.

The tenth annual series of summer symphony concerts was presented at the Music Shell on the Storrow Memorial Embankment, Boston. These concerts are played by a group of 50 members of the Boston Symphony Orchestra under the direction of Arthur Fiedler, Conductor. The series included 21 concerts played between July 7 and July 31 inclusive. The concerts are always well attended, the attendance at this season's series being estimated at 185,000. 60,597 folding chairs were rented during the concerts and the commission received \$3,332.84 as its share of the receipts from rental charges, the money being

deposited with the State Treasurer. By a Legislative act, \$5,000 was contributed by the Metropolitan District Commission towards the cost of the Esplanade Concerts.

The members of the concert orchestra played two special concerts for children on July 15 and July 27. These concerts attracted very large attendance because of the co-operation of playground instructors and others interested in children's group activities as a means of keeping them off the city streets where traffic hazards are so great.

#### CIVILIAN CONSERVATION CORPS

Our remaining C. C. C. camp at Breakheart Reservation in Saugus continued in operation through the year. A detail of boys were assigned to the Blue Hills Reservation in periods of good weather to complete the development of the Overlook at the summit of Great Blue Hill. The stone observation tower was finished and the adjoining shelter brought along to about 90% of completion. The terrace, approaches and path layout should be finished by the early summer of 1939.

At Breakheart Reservation work has continued on the approved development plan for this area. The double driveway entrance road from Lynn Fells Parkway to the reservation proper and the one-way motor road were finished and will be given a bituminous surface treatment in the spring. The parking areas at the Lower Pond and Pine Top were completed; the area at the Upper Pond is under construction. Truck trails for fire fighting, insect pest control and other maintenance purposes have been completed in the section between the upper and lower ponds and in the Wakefield end of the reservation. Another truck trail north of Water Street is partially completed. 10,000 man days of labor were expended on gypsy moth creosoting and spraying in both Breakheart and Middlesex Fells. Only one small fire near the Lower Pond was encountered during the season which was quickly extinguished with no loss of trees. Two old and unsightly gravel pits were graded over so that the localities were given a natural and pleasing aspect. The small log cabin on the easterly side of the Lower Pond was razed as it needed extensive repairs. It served no useful purpose in the reservation and constituted a fire hazard and a problem in policing. The Commission cooperated with the National Park Recreational agents in taking a census of week end visitors to Breakheart and Middlesex Fells in order that definite information regarding the number of persons taking advantage of recreational facilities of various kinds at both areas, might be determined.

The clean up of roads and truck trails after the hurricane of September 21, 1938 was promptly completed and then the most seriously damaged sections were cleared. Work details continued on clearing until early November at both Breakheart and Middlesex Fells and one crew has been assigned to fire hazard reduction at Breakheart until the clean up is completed. In November a crew of 100 boys was placed on fire hazard reduction in the towns of Lincoln and Reading at the request of the federal agents cooperating on this class of work. Both towns were exposed to very serious conditions which the local authorities wished to eliminate before the spring season. This work continued until the end of the calendar year. The hurricane demolished the fourteen-car frame garage which housed trucks and other equipment. This structure was rebuilt by work details under Army supervision.

During the 1938 season a total of 36,602 man days were worked on all projects.

The Army has erected a new school house at the camp for the various educational activities which are excellently directed by the present educational adviser, Mr. Frank R. Finn.

Captain William H. Smith has continued as company commander and Dr. Alexander H. McRobie continues as camp physician. Lieutenants Knowlton and Capasso are now assigned to the camp as assistants to Captain Smith. The Corps Area Commander has designated Breakheart as a training station for new officers for C.C.C. duty. Four new officers will be assigned for such training periodically.



## WORKS PROGRESS ADMINISTRATION

During the year 1938 the Commission, in cooperation with the Works Progress Administration for Massachusetts, sponsored a total of 21 new W.P.A. projects within the Parks District. Three separate legislative appropriations to the commission were used to obtain Federal funds: (1) From an appropriation of \$50,000 for the Procurement of W.P.A. Funds \$47,950 was allocated for the purchase of materials and supplies for thirteen projects. In addition, personnel services, the use of automotive and construction equipment and miscellaneous hand tools, materials and supplies were contributed which had a value of \$257,368. For a total sponsor's contribution of \$305,318 Federal funds of \$807,253 were obtained for labor, material and supplies. (2) From an appropriation of \$650,000 for hurricane clean up and repair, \$71,637 was allocated to cover the commission's entire cost on five projects for which Federal funds of \$457,067 were granted. (3) From an appropriation of \$250,000 for resurfacing of roadways, \$104,338 was allocated for the purchase of materials and supplies on three projects. In addition, personnel services, equipment, miscellaneous tools, materials and supplies valued at \$66,791 were contributed. The total sponsor's contribution was \$171,129 and Federal funds of \$248,120 for labor were secured. To summarize, for the pledge of \$233,925 from special appropriations and services, materials, etc., valued at \$324,113 or a grand total contribution of \$548,084, Federal funds totaling \$1,512,440 were granted. The grand total value of all W.P.A. projects approved during the year was \$2,060,524.

The new projects as drafted, provided employment for 4,164 W.P.A. men and a total of 23,595 man months of work.

The following list briefly describes the principal work items or objectives of all new projects worked or approved during 1938: \$50,000-Budget Appropriation:

Blue Hills Division, in Boston; this project provided for extensive beautification work of road construction, sidewalk construction, grading of roadside slopes, drainage, etc. in Stony Brook Reservation, Bellevue Hill Section, Veterans of Foreign Wars Parkway, Spring Street recreational area and West Roxbury Parkway.

Stony Brook Reservation, Neponset Valley Parkway, West Roxbury Parkway, Dedham Parkway, Veterans of Foreign Wars Parkway, Turtle Pond Parkway; work is in progress in all the areas on tree conservation work which consists of the removal of dead and diseased limbs from approximately 7,000 trees, cutting down and removing stumps of about 300 trees, cleaning and filling approximately 200 cavities and the removal of all waste material.

Ponkapoag Public Golf Course; work was started in the late fall to complete the development of nine additional holes at the course. Under this project, clearing, grubbing, grading and loaming is being done, new roads with necessary drainage are being constructed and a complete fairways watering system is being installed for the entire twenty-seven holes.

Blue Hills Reservation area and Furnace Brook Parkway in Quincy; workers started the last of August on tree conservation work in this area. An estimate of all work to be done includes the removal of dead and diseased limbs from 1,200 trees, cutting down and removing stumps of 400 trees, cleaning and filling 500 cavities and removing 800 loads of deadwood.

Blue Hills Parkway; in the early spring of 1939, work will be started on the construction of a bituminous concrete walk from Kahler Avenue to Canton Avenue. The major items of work are the construction of 6,900 linear feet of 6-ft. wide bituminous concrete walk, regrading, loaming and seeding of 920 linear feet of 9-ft. wide planting space and 4,600 linear feet of 5-ft. wide planting space.

Chickatawbut Road, Braintree; work will be started in the early spring of 1939 on the general improvement and beautification of the Chickatawbut Road entrance to Blue Hills Reservation. Work will include tree removal, clearing, excavation, rip-rapping of brooks, rubble wall construction, fence relocation, road drainage, resurfacing of surface road, grading, loaming and seeding and all incidental work.

Blue Hill River Road and Ponkapoag Trail, Milton; early in 1939 work will be begun on additional improvements at the recreational area adjacent to Hoosicwhisick Pond. The project provides for the construction of 3,250 linear feet of roadway 12-ft. wide, two parking spaces of 17,000 square yards, clearing and grubbing of 145,000 square yards of wooded land and incidental work of grading, laying drains, removing trees, etc.

Charles River Reservation, Cambridge; a supplementary project for the completion of, and additional improvements of, the Charles River Reservation between Charles River Dam and Mount Auburn Street was approved in November of 1938 and work will be continued through the winter as weather permits. The project provides for the construction of 1,500 linear feet of 6-ft. wide stone dust walks, 1,500 square yards of bituminous concrete walks, 320 square yards of Portland cement concrete walks; the installation of 5,500 linear feet of concrete curbing for parking spaces, 100 linear feet of 1-ft. by 4-ft. concrete wall; placing of 5,000 linear feet of one-man-stone slope paving 1-ft. thick and 5-ft. wide; 50,000 square yards of grading of ball field and river bank areas; and all incidental work such as seeding, repairing and painting benches, tennis court fences, etc.

Quinobequin Road, Newton; the construction of 9,400 linear feet of 5-ft. wide stone dust sidewalk and regrading of adjacent 10-ft. wide planting space along Quinobequin Road between Washington and Boylston streets was commenced.

South Border Road, Middlesex Fells Reservation, Medford; the development and beautification of Upper and Lower Bellevue Ponds on South Border Road was continued and a supplementary project approved which permitted completion of the original project and the extension of work to encompass a greater area. Principal items of work under the supplement are grubbing and grading of 15 acres, construction of 5,000 square yards of gravel walks, 3,000 cubic yards of excavation on banks and in ponds, placing and grading of 3,000 cubic yards of fill borrow on banks and in low areas and performing incidental work of construction of rustic bridges and benches, masonry walks and culverts, placing shore protection, etc.

Middlesex Fells Reservation in Winchester; work continued on the reconstruction of 3 miles of bridle paths and construction of 1 mile of new paths in the Winchester section of the reservation. A supplementary project was approved which permitted the completion of work, the cost having been high for the early work because of the difficulty of winter operations early in 1938.

Nahant Beach Parkway, Nahant; a project for recreational improvements along the parkway was approved in November, 1938. Construction will start in the spring on 18 fire places, 24 tables and 48 benches and the installation of 24 drinking fountains and a connecting 5,000 feet of 1-inch brass pipe.

Revere Beach Reservation and Parkway, Revere; work was begun on the completion of 1937 work at Revere Beach; the construction of 4,000 linear feet of new seawall near Northern Circle and the construction of a bituminous concrete walk, installation of granite curbing, grading and seeding of planting space and incidental work along Revere Beach Parkway between Winthrop Avenue and Broadway.

### *Hurricane Projects:*

Immediately following the appropriation by the Legislature of funds for hurricane clean up and repair work, two W.P.A. project proposals were drafted and submitted for work in the Blue Hills Division. The first, on which work was started December 27, received a Federal allocation of \$159,720 for rehabilitation of 6,700 acres of Blue Hills Division areas in Quincy and provides for a total of 2,640 man-months of work. The second proposal will be submitted the first of January, 1939, but the Commission's cost was reserved in the Hurricane Fund. This proposal carries a request of \$41,170 of Federal funds and will provide 672 man-months of labor in the Stony Brook Reservation, Hyde Park.



In the Middlesex Fells Division, three proposals were submitted and received approval. The first, providing for emergency reconstruction of 2½ miles of the Police Signal System in the Medford and Winchester sections, received a Federal allocation of \$9,811 and provided 144 man-months of work. The second, providing for the reconstruction of 3¾ miles of the signal system in the Melrose, Malden and Stoneham sections, received a Federal appropriation of \$9,184 and covers 145 man-months of labor. The third project, for the removal of all fallen trees and debris in the Middlesex Fells Reservation, or as much as can be done with the funds available, was given a Federal grant of \$237,180 and provided for 3,906 man-months of work.

*Resurfacing Projects:*

In order to obtain the maximum value from the budget appropriation for resurfacing of roads within the Parks District, it was deemed advisable to co-operate with the W.P.A. relief program and instigate projects for the necessary resurfacing of three heavily travelled reservation roads. From experience on other W.P.A. construction projects, it was known that work would be performed of a quality comparable to contract work and at a lesser expense to the Commission because the W.P.A. would provide funds for all labor costs; the sponsor furnishing all materials and supplies, construction equipment, small tools, etc. The three projects, which were approved and on which work was started late in the year, provide for the reconstruction of: first, Wampatuck Road from Furnace Brook Parkway to Chickatawbut Road, Quincy, a distance of 4,800 feet; second, Norumbega Road, from River Street to Commonwealth Avenue, Weston, 4,850 linear feet; third, East Border Road, from Fellsway East, Malden to Highland Avenue, Medford, 2,900 feet in length. All these roads will have a width of 30 feet and have a 5-inch bituminous concrete surface on a 12-inch gravel base. Also, an 8-ft. wide, 2-inch bituminous surfaced walk will be constructed adjacent to and for the whole length of each road. Work will include excavation of earth, rock and ledge, installation of drainage systems, filling and grading, loaming and beautification of contiguous areas and all incidental work demanded for the practical and esthetic completion of the projects. Work on all roads has been progressing well considering the difficulty of conducting such work in the winter season.

W.P.A. — M.D.C. RECREATION PROJECT

The recreation project, which was first operated in 1937, was continued during the year. There was an increased participation in all activities conducted by the project supervisors. The estimated total of persons who actively took part in the many recreational programs is as follows:

Baseball . . . . .	104,144	Skiing . . . . .	13,850
Basketball . . . . .	6,500	Soft Ball . . . . .	23,030
Birdhouses . . . . .	2,500	Tennis . . . . .	25,442
Fishing . . . . .	10,097	Tobogganing . . . . .	14,900
Football . . . . .	98,730	Volley Ball . . . . .	25,750
Hiking . . . . .	104,900	Weenie Roasts . . . . .	2,500
Horeshoes . . . . .	45,854	Special outings for adults,	
Moonlight walks . . . . .	3,090	children, clubs, etc.,	
Nature walks . . . . .	106,860	not included above . . .	125,657
Picnics . . . . .	17,500		
Skating . . . . .	42,250	Total . . . . .	773,554

The project personnel kept a careful check on the public appreciation or acceptance of the various activities and concentrated on those best received. It was found that the nature walks were especially well patronized and indicated a keen desire among persons of all ages to know more of the interesting subject of nature in its many forms of animal, bird and still life.

During the year, all activities were scheduled about a week ahead and notices were mailed to all interested individuals, clubs, churches, etc. In addition to the regular functions of the project, all supervisors cooperated fully with many groups and sponsored special functions for them. The services of the staff naturalist were much in demand and he devoted much time and interest to his work.

Instruction and supervision was given for all winter sports during the first three months of the year. Skating areas were maintained as required. During the summer vacation months, many sports and games were conducted for the children with particular consideration being given to keeping the type of activities in proper relation to the summer heat. Instruction was given in tennis and baseball, horseshoe ranges were maintained and supervised and swimming instructors and life guards were on duty at many of the commission's beaches. The fall sport of football was encouraged by giving instruction in kicking, passing, etc., and tag football games were conducted. During the late fall, new ice hockey and skating areas were developed in cooperation with the National Youth Administration. Also, with the assistance of the later group, many bird houses were built in the early spring and erected throughout the Parks District and in the fall bird-feeding stations were made, erected and periodically stocked with suitable food.

The public demand for supervised recreation is so great that this very beneficial project will be continued as long as W.P.A. funds are obtainable.

### HURRICANE DAMAGE

The devastating and disastrous wind storm of September 21, 1938 wreaked havoc in many sections of the Metropolitan Parks and Water Districts. Although none of our buildings or other structures were damaged to a major degree, few of them escaped without some damage to windows, roofs and chimneys. These repair costs are estimated at \$25,000.00. The rip-rap of the North Dike at the Wachusett Reservoir was badly washed out by waves kicked up by the storm. A repair contract for this work will run to \$9,500 in cost. Extensive damage to police signal service and street lighting systems will require repair expenditures of \$35,000.00.

The destruction of street and shade trees and standing timber in our wooded reservations and on watershed lands is, of course incalculable. The enormous amount of work which will be necessary to clean up our forested lands will take several years of intense effort.

The maintenance and operating personnel of the Parks Division concentrated on a clean-up of all main automobile roads as soon as the storm ceased so that interference with the flow of traffic on these roads was eliminated during the early part of the following day. Several hundred emergency laborers were given assignments on further clean-up of secondary and service roads in order that access to areas where fire hazards were greatest, could be provided.

The Commission submitted estimates to the budget commissioner as soon as our studies of the extent of the damage were completed and the special session of the legislature called by His Excellency, the Governor, provided appropriations of \$650,000 for Parks Division purposes and \$100,000 for the Water Division early in November. The only contract for tree removal work which the Commission deemed necessary was awarded to J. J. Callahan for the removal of approximately 1,000 standing trees and stumps along Middlesex Fells Parkway. Callahan's bid was the lowest of eighteen submitted, ranging from \$13,770.00 to \$75,000.00.

With the exception of a few small building repair contracts of less than \$1,000.00 in amount it is not the intention of the Commission to make any further expenditures from Hurricane Damage appropriations, on a contract basis. About 450 temporary laborers are now being employed on fire hazard reduction and other forest clean-up in addition to 1,200 W.P.A. workers assigned to projects which the Commission is sponsoring. An apportionment went for the purchase of specialized fire fighting equipment, and has been set up so that



our division will be equipped to some degree to combat the serious fire hazards which must be faced during the coming spring season.

A very regrettable incident of the hurricane was the vast amount of damage to motor and sail boats moored in the Charles River Basin. With the exception of a comparatively small number of boats with stout moorings, the fleet was badly battered against the granite wall on the Cambridge side of the river. Many of the boats floundered and those which remained afloat were damaged to a costly degree. A few owners, who were able to get to the river, were assisted by our river patrol to board their boats and by running their engines to ease the strain on their moorings, were able to ride out the storm in safety.

## V. Special Investigations

In accordance with Chapter 12 of the Resolves of 1938, the Metropolitan District Commission and the Department of Public Health were required to make an investigation and report relative to sewage pollution of the Charles River. The report is printed as Senate No. 427.

In accordance with Chapter 14 of the Resolves of 1938, the Metropolitan District Commission was required to make an investigation and report relative to the construction and maintenance in the city of Boston of a park as a memorial to the locality where the frigate "Constitution" was constructed. The report is printed as House No. 1620.

In accordance with Chapter 20 of the Resolves of 1938, the Metropolitan District Commission was required to make an investigation and report relative to the acquisition of certain land on the shore of the Charles River opposite the John A. Havey Memorial Beach in West Roxbury. The report is printed as House No. 1614.

In accordance with Chapter 21 of the Resolves of 1938, the Metropolitan District Commission was required to make an investigation and report relative to the erection of a tunnel under the roadway near the state bathhouse in the city of Lynn. The report is printed as House No. 1615.

In accordance with Chapter 47 of the Resolves of 1938, the Metropolitan District Commission was required to make an investigation and report relative to providing suitable outdoor public bathing facilities in the town of West Boylston. The report is printed as House No. 1906.

In accordance with Chapter 56 of the Resolves of 1938, the Metropolitan District Commission and the Department of Public Health were required to make an investigation and report relative to the advisability of establishing a method of assessing, financing and maintenance cost of the Metropolitan Sewerage Districts on the basis of volume of sewage discharged thereinto. The report is printed as House No. 1713.

In accordance with Chapter 60 of the Resolves of 1938, the Metropolitan District Commission was required to make an investigation and report relative to the advisability of establishing a new basis of payments to meet the costs of the water system of the Metropolitan Water District. The report is printed as House No. 2055.

## VI. Police Department

During the past year the following changes occurred in the personnel of the Metropolitan District Police:

Sergeant J. Bernard Marshall, who was appointed to the force May 5, 1900, died on May 15, 1938.

Lieutenant Daniel MacLeod, appointed to the force April 15, 1902, was retired June 1, 1938. Sergeant William H. Brown, appointed June 1, 1909, was retired August 2, 1938. Officer Edward T. Quinn, appointed June 3, 1896, was retired May 10, 1938. Officer Walter M. Ridlon, appointed May 25, 1908, was retired May 25, 1938. Officer Hubert A. McMasters, appointed April 22, 1919, was retired May 26, 1938. Officer John J. Sullivan, appointed April 15, 1903, was retired September 9, 1938. Officer Daniel F. Murphy, appointed July 18, 1906, was retired September 22, 1938.

Sergeant William J. Marley was promoted to the rank of Lieutenant on June 3, 1938. Three officers were promoted to Sergeants, eleven men were appointed as regular patrolmen and three patrolmen were reinstated.

During the year the following officers were commended in General Orders by the Commission:

Officer Walter F. Shaw  
Officer Thomas W. J. Tevlin  
Officer Arthur J. Reinstein

At the end of 1938 the force was as follows:

1 Superintendent  
1 Deputy Superintendent  
6 Captains  
6 Lieutenants  
21 Sergeants  
194 Patrolmen  
1 Policewoman

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230 Total

Lost and stolen property, the total value of which was \$66,875.00 was recovered and returned to the owners.

7810 hours of extra duty, without compensation, were performed by members of the force to care for visitors at special functions, such as handling the crowds at football games, concerts, regattas, races, etc. 243 ambulance and 323 patrol wagon calls were answered during the year.

The department had 2,401 cases before the various courts during the year. Not included in the court cases were 90 cases of wayward girls and women and delinquent boys which were handled by the policewoman and police officers without court action. Several of the girls apprehended had been reported as runaways. Of the cases before the courts, 912 were for offenses against the General Laws, 675 for Motor Vehicle Law violations and 814 for offenses against the Metropolitan District Commission Rules and Regulations. Of the Motor Vehicle Law violations, 154 cases were for operating under the influence of intoxicating liquor and 78 cases of driving so as to endanger the lives and safety of the public. Of the offences against the Metropolitan District Commission Rules and Regulations, there were 114 violations of the General Rules, 174 violations of the Auto Rules and 526 violations of the Speed Regulations. Fines totalling \$17,940 were assessed by the courts. A detailed listing of the above cases may be found in Appendix No. 3.

The morale and discipline of the department has been excellent; it not being necessary to bring charges against any officer during the year.

During January and February, the department was drilled in marching according to U. S. Army regulations under Deputy Superintendent Henry R. Hayes as Drillmaster and Lieutenant William G. Kiniry as Assistant Drillmaster. These drills were preceded by lectures on criminal law, court procedure, first-aid, and instruction in the use of firearms and gas equipment, given by superior officers of the department and others.

During the year, thirty-one illustrated talks concerning the activities of the department were given by the Superintendent and the Deputy Superintendent before Rotary and Kiwanis Clubs, Church Organizations, Parent-Teachers Groups, Men's Clubs, American Legion and Veterans of Foreign Wars Posts and before many civic and fraternal bodies. One talk was before the Boston Rotary Club, the largest Rotary Club in New England.

On April 12, 1938, the Commissioner, upon the request of the Board of Selectmen and the Constitution Day Committee of the town of Belmont, directed the Superintendent to detail the Deputy Superintendent, two Lieutenants, six Sergeants, thirty-two Patrolmen, marching in infantry formation, and four mounted (horse) Patrolmen, to participate in the Constitution Day Parade held in that town. This detail led the parade and were awarded the first prize for good appearance and fine marching. The prize, a large silver cup,



was presented to the Commissioner on April 21, 1938, by the Chairman of the Board of Selectmen of Belmont and is now in Commissioner Hultman's office.

The Commissioner, at the request of the Dorchester Day Parade Committee, directed the Superintendent to detail the Deputy Superintendent, two Lieutenants, six Sergeants, thirty-two Patrolmen, marching in infantry formation and four mounted (horse) Patrolmen, to lead the parade held in that district of the city of Boston on June 4, 1938. This detail made a good showing and occasioned favorable comment from press and public.

On June 18, 1938, the President of the United States attended the wedding of his son, John Roosevelt, to Miss Anne Clark, at the town of Nahant. The President landed from the Yacht Potomac at Salem and proceeded over our parkways to the Clark home in Nahant. Commissioner Hultman, responding to the request of the Board of Selectmen of Nahant, directed Superintendent Woods to detail and to command the largest detail of officers in the history of the department, during the President's visit to Massachusetts.

This detail consisted of the Deputy Superintendent, one Captain, four Lieutenants, fifteen Sergeants, six mounted (horse) Patrolmen, ten motorcycle Patrolmen and one hundred and eighty foot Patrolmen. The motorcycle officers escorted the Presidential party from Salem to Nahant and return. A Detective Sergeant and two plain clothes officers were assigned to work with the United States Secret Service detail guarding the President. The mounted officers and motorcycle officers performed traffic duty and assisted the large force of foot Patrolmen in handling the vast crowd. One Sergeant and six Patrolmen guarded the Clark home for three days.

The work and the conduct of our men was so excellent that Commissioner Hultman received letters of appreciation and commendation from Colonel William Starling who commands the White House detail of the U. S. Secret Service and from the Board of Selectmen and the Chief of Police of the town of Nahant. Superintendent Woods and the Deputy Superintendent were summoned by the President and personally thanked for the fine protection given him and his party while they were in the Metropolitan District.

On June 21, 1938, the Commissioner, acceding to the request of His Honor, Mayor Manning of Lynn, directed the Superintendent to detail the following officers to participate in the Constitution Day parade in that city: The Deputy Superintendent, two Lieutenants, Six Sergeants, thirty-two Patrolmen, marching in infantry formation and four mounted (horse) Patrolmen. This detail led the Civic Division and were awarded first prize. The certificate of award is now in the Commissioner's office.

Commissioner Hultman granted the request of His Honor, Mayor Hansen and Brigadier General George Moyse, M.N.G., (State Senator) of the City of Waltham and directed the Superintendent to detail the Deputy Superintendent, two Lieutenants, six Sergeants, forty-eight Patrolmen, marching in infantry formation and four mounted (horse) Patrolmen, to that city for the monster parade celebrating Constitution Day and the convention of the 101st Infantry Association. This detail made an excellent impression and were praised by the press and public.

As a result of the September hurricane and the subsequent conditions in western, southern and southeastern Massachusetts, as well as in the neighboring states of Rhode Island and Connecticut, Governor Hurley called upon Commissioner Hultman to render necessary assistance to the Commissioner of Public Safety in assisting the Massachusetts State Police on Sunday, September 25, 1938. A very rapid and effective mobilization followed and at six o'clock P.M., on Saturday, September 24, 1938, four hours after the order was given by the Commissioner, the following detail of officers and equipment left our six divisions for State Police barracks and sub-stations throughout the State: two Lieutenants, four Sergeants, and sixty-four Patrolmen. The following police motor equipment went forward with this detail: four patrol wagons equipped with floodlights, first-aid kits, etc., eight cruising cars completely equipped for patrol duty and six motorcycles to be used for patrol duty on the Worcester, Concord and Newburyport turnpikes. These officers spent the night at State

Police barracks and sub-stations at Framingham, Concord, Andover, Topsfield, West Bridgewater, Norwell, Rehoboth, Brookfield and Grafton. The officers went on duty the following Sunday and enforced the Governor's order prohibiting the curious and sightseeing public from entering the devastated areas. The greater part of the uniformed State Police were on duty in the flooded portion of western Massachusetts and it would have been impossible to perform this important duty without the aid of the Metropolitan Police. Commissioner Hultman received a letter of appreciation from the Commissioner of Public Safety, in which the latter commented upon the excellent conduct and attention to duty displayed by our officers.

In addition to the above duties, our department assisted the local police departments at football games and other events in many of the cities and towns in the district in response to the request of local authorities. They also performed the usual police duty at football games at the Harvard Stadium, the Esplanade concerts on the Charles River Basin Embankment and at band concerts throughout the summer.

## VII. Metropolitan Water District and Works

The Water District now includes 20 municipalities with an area of about 174 square miles and a population, as of July 1, 1938, of 1,585,150. The Water Works lands include an area of about 19,000 acres.

The works under the control of the Water Division include 9 storage reservoirs with 200 square miles of tributary watershed, a total storage capacity of 80 billion gallons and water surface of 8,600 acres; 60 miles of aqueducts; 2 hydro-electric power stations with a combined capacity of 7,000 horse power; 16 miles of high-tension power transmission line; 6 distribution pumping stations with a combined equipment of 7,900 horse power and pumping capacity of 346 million gallons a day; 13 distribution reservoirs with a capacity of .25 billion gallons and 179.24 miles of distribution mains. The consumption of water from the Metropolitan Water Works during the year by the 18 municipalities entirely supplied was 47,515,964,000 gallons, equivalent to an average daily consumption of 130,180,700 gallons or 89 gallons per capita for a population of 1,465,970 in the district supplied.

### CONSTRUCTION

Water Works development cannot be expanded piecemeal as the necessity demands but must come in steps along well-planned lines which should be carefully studied in order to economically construct supply mains to meet new conditions. Liberal estimates should be made and appropriations should be available so that when the necessity arises, there will be water of excellent quality and of sufficient quantity deliverable at the required pressure.

It is a well-known fact that during the last few years there has been a steady growth of population in districts outside of Boston proper, but due to the fact that these municipalities are fully metered and that particular attention has been given to the elimination of waste of water, there has not been a serious increase in the per capita consumption. The present facilities cannot provide an adequate supply of water for the building developments now in progress in the elevated portions of the suburbs.

Work on pipe lines during the year has reinforced the supplies for the larger industrial and commercial areas of the District.

### *Reinforcement of Low-service Pipe Lines*

The work of V. J. Grande Company of Boston, under Contract No. 114, for laying of 48-inch steel water main in Everett and Chelsea, which had been suspended for the winter on December 22, 1937 was resumed on April 4, 1938.

The work to complete this contract consisted of resetting curbing in Everett and Chelsea and resurfacing Everett Avenue, Broadway and Cross Street, Chelsea. The different types of resurfacing included grouted granite block and



brick paving on concrete base, reinforced concrete pavement, bituminous Macadam pavement and brick and granolithic sidewalks. All this work was done to the satisfaction of the Public Works Department of Chelsea.

This contract was completed on June 16, 1938, at a total expenditure of \$287,849.18.

This line, after being sterilized and tested, was put in service on January 24, 1938.

The work of V. Barletta Company of Boston, under Contracts No. 120 and No. 121 for laying 42-inch and 48-inch mains for reinforcing the low-service supply in Everett, Chelsea and East Boston was completed in 1938.

Under Contract No. 120, the work of constructing a water pipe tunnel under Malden River between Medford and Everett was about 80% completed at the beginning of the year. The work comprised the construction by the pneumatic process of a water pipe tunnel about 0.4 of a mile northerly from the Revere Beach Parkway Crossing which included two 63-foot vertical shafts on each side of the river connected by a 350-foot horizontal section under the river.

The caissons of 10-foot nominal diameter were made in sections using  $\frac{3}{4}$  of an inch steel and lined with water-tight masonry 12 inches in thickness. The shaft guards were constructed by driving for each shaft a ring of oak piles braced with batter piles and framed together with white oak timber collars.

A 42-inch flanged steel water pipe, furnished by the Commonwealth was laid in the tunnel and the space between the pipe and the tunnel lining was completely filled with Portland cement concrete and grout. After the installation of the pipe, a hydrostatic test of the pipe lining between caps temporarily placed on top vertical pipes in each shaft showed no measurable leakage.

The work on this contract was completed on June 24, 1938 at a total expenditure of \$103,952.00.

Under Contract No. 121, the work of furnishing and laying 5,645 linear feet of 48-inch steel main in Malden and Everett which was approximately 30% completed at the beginning of the year was resumed on March 14, 1938.

Much of this pipe was laid on pile foundation and through private property in which an easement had been acquired by the Commonwealth, and connections were made with the tunnel under Malden River and with existing mains laid in Third Street, Medford, and Winthrop Street, Everett.

By agreements with the Contractor, the cities of Medford and Everett took over the resurfacing of Third Street in Medford and Appleton Street in Everett.

The work on this contract was completed on August 23, 1938 at a total expenditure of \$144,396.70.

This line, after being sterilized and tested, was put in service on December 20, 1938.

#### *Stock for Improvements for Reinforcing Pipe Lines*

Contract No. 124 was made with the Cambridge Machine and Valve, Inc., of Cambridge, on November 22, 1937, for furnishing from Metropolitan patterns forty-eight screw-lift valves, varying in size from 12 inches to 36 inches in diameter. The work on this contract was completed on August 29, 1938 at a total expenditure of \$23,156.00. Inspection at the foundry, amounting to \$2,704.00, has been added to the cost of this stock.

Contract No. 125 was made with the Warren Foundry and Pipe Corporation of Massachusetts on May 23, 1938 for furnishing 211.9 tons of pit cast cement-lined bell and spigot water pipe, varying in size from 6 inches to 20 inches in diameter and 65.03 tons of tar-coated bell and spigot special castings, varying in size from 4 inches to 36 inches in diameter. The work on this contract was completed on August 30, 1938 at a total expenditure of \$19,625.02.

#### *Extension of Intermediate High-service Pipe Lines to Arlington*

Contract No. 126 was made with Crowley & Downey of Quincy, on July 25, 1938 for furnishing and laying about 2,038 linear feet of 20-inch cast-iron pipe

from the Intermediate High-service Reservoir to Highland Avenue, Arlington in order to supply a section of Arlington which is now being supplied from the Northern Extra High-service.

Work on this contract began August 1, 1938 but the progress was unsatisfactory and after laying approximately 1,375 linear feet of 20-inch cast-iron pipe the work came to a standstill. On November 3, the Commission, on account of the default of Crowley & Downey, ordered the work to be completed by the Bonding Company, the Aetna Casualty and Surety Company, who, on November 9, 1938 made an agreement with John A. Gaffey & Son of Medford. On November 14 work was resumed.

This contract was completed on December 17, 1938 at a total expenditure of \$5,680.74.

This line has been filled, tested and sterilized, but has not been put in service.

### *Reinforcing Southern High-service Pipe Lines*

Contract No. 128, P.W.A. Docket No. Mass. 1516-F — Mass. State Project No. D-203, was made with M. DeMatteo Construction Company of Roslindale on October 18, 1938 for the sum of \$187,617.50, and was accepted by the Federal Emergency Administration of Public Works on October 20, 1938.

The work on this contract comprised the furnishing and laying of about 11,000 linear feet of 36-inch steel water pipe for reinforcing Southern High-service Pipe Lines to Milton, Quincy and the Dorchester District of Boston.

This work was started on October 26, 1938 and at the end of the year approximately 16.7% was completed which included furnishing and laying 1,912 linear feet of 36-inch steel pipe using Dresser pipe couplings for joints and the value of this work amounted to \$31,532.38.

Valves and cast-iron pipe for this contract had already been purchased and are in storage in pipe yards and will be requisitioned for as required.

## MAINTENANCE

### *Precipitation and Yield of Watersheds*

The annual precipitation of 58.09 inches on the Wachusett watershed is 12.15 inches above the average for the past 42 years. This was the greatest yearly total for the period of records. The precipitation was well above normal during January, June, July and September, and somewhat below normal during February, March, April, August, October and December. The precipitation of 11.09 inches during the month of September was the maximum for any one month during the 42 years of records. For the Sudbury watershed the annual precipitation of 58.40 inches is 13.62 inches above the average for the past 64 years and for the Cochituate watershed the annual precipitation of 61.23 inches is 16.02 inches above the average for the past 76 years.

The average daily yield per square mile of the watersheds was 1,759,700 gallons for the Wachusett, 1,586,600 gallons for the Sudbury and 1,623,300 gallons for the Cochituate. These yields are above the average by nearly 56.6% on the Wachusett watershed, 61.8% on the Sudbury and 71.6% on the Cochituate watershed.

### *Storage Reservoirs*

The capacities of the storage reservoirs of the Metropolitan Water Works, the elevation of the water surfaces and the quantity of water stored in each reservoir at the beginning and at the end of the year are shown by the following table:



STORAGE RESERVOIRS	Eleva- tion <sup>1</sup> *	Total Capacity (Gallons)	JAN. 1, 1938		JAN. 1, 1939	
			Eleva- tion <sup>1</sup> of Water Sur- face	Available Storage (Gallons)	Eleva- tion <sup>1</sup> of Water Sur- face	Available Storage (Gallons)
Cochituate Watershed:—						
Lake Cochituate . . .	144.36	2,097,100,000	142.97	1,672,380,000	142.62	1,591,040,000
Sudbury Watershed:—						
Sudbury Reservoir . . .	260.00	7,253,500,000	257.38	4,914,120,000	257.33	4,893,750,000
Framingham Res. No. 1 . .	169.32	289,900,000	167.90	134,700,000	167.93	135,990,000
Framingham Res. No. 2 . .	177.12	529,900,000	176.26	442,880,000	176.23	441,590,000
Framingham Res. No. 3 . .	186.50	1,180,000,000	184.70	855,100,000	184.27	820,900,000
Ashland Reservoir . . .	225.21	1,416,400,000	224.51	961,850,000	224.47	959,650,000
Hopkinton Reservoir . . .	305.00	1,520,900,000	304.20	1,019,800,000	304.11	1,014,220,000
Whitehall Reservoir . . .	337.91	1,256,900,000	337.40	850,500,000	337.41	852,440,000
Wachusett Watershed:—						
Wachusett Reservoir . . .	396.50	67,000,000,000	393.64	52,145,380,000	392.45	50,567,150,000
Totals . . . . .	—	82,544,600,000	—	62,996,710,000	—	61,276,730,000

<sup>1</sup>Elevation in feet above Boston City Base.  
\*Full reservoir with flashboards on overflow.

The total storage capacity in the third column of the table is to the bottom of the reservoirs. The available storage shown in columns 5 and 7 is the quantity that can be conveniently used for consumption.

Wachusett Reservoir

The water in the Wachusett Reservoir was about 1.36 feet below the normal high-water line, elevation 395.00, at the beginning of the year. The quantity of water in storage then was 63,145,400,000 gallons or 97.19% of capacity. The water remained at substantially that elevation until January 26 when heavy rains filled the reservoir to full level. The water was held, with flashboards on the waste weir, within the two feet above normal full reservoir level until October 6. After that date the water level was purposely lowered from two to three feet below normal full reservoir level to facilitate repairs to structures along the shore of the reservoir damaged during the Hurricane of September 21. As the water level of the reservoir was above the elevation of the lower section of the spillway, elevation 392.00, throughout the year, there was a continuous flow from the reservoir into the Nashua River below the dam, varying from 1,600,000 gallons per day as leakage at the flashboards to 2,339,700,000 gallons per day. The maximum rate of 2,646,000,000 gallons per day lasted from 8:15 P.M. September 21 to 8:00 A.M. September 22 with the reservoir at its maximum elevation of 396.97, containing 67,645,000,000 gallons of water.

No water was discharged into the Wachusett Reservoir watershed from the Ware River watershed during the year.

No water was pumped from the Wachusett Reservoir by the town of Clinton during the year, under the provisions of the Acts of 1923, Chapter 348, or by the town of Lancaster under the provisions of Acts of 1936, Chapter 299.

During all or a part of each of the twelve months of the year, the city of Worcester discharged a total of 5,210,400,000 gallons of water into the Wachusett Reservoir watershed from the Pine Hill area, Holden, formerly tributary to the reservoir, which was diverted by the city for its supply in 1911. The city also has the right to divert water from the Quinapoxet Pond watershed, which is also tributary to the Wachusett Reservoir, but has not yet diverted any water from this area.

During the year 34,222,500,000 gallons of water was discharged into the Nashua River below the dam, of which 33,658,300,000 gallons flowed over the spillway and 564,200,000 gallons was drawn through the fountain in the pool in accordance with the provisions of General Laws, Chapter 92, Section 14. At the close of the year the water in the reservoir was at elevation 392.45 or 2.55 feet below normal full reservoir level and it then contained 61,567,200,000 gallons

of water or 94.77% of capacity. The net loss in the amount of water in storage from the beginning to the close of the year was 1,578,200,000 gallons.

Wire fences, aggregating 2,940 linear feet, were erected to enclose Water Works land in West Boylston at a cost of \$0.18 per linear foot exclusive of the cost of posts which were secured during forestry operations. The town of West Boylston reimbursed the Commonwealth for the erection of 1,560 linear feet of this fence as it was required in connection with the relocation of a portion of Temple Street.

The Fish Ladder at the Circular Dam at the head of the reservoir at the Quinapoxet Basin was in service continuously from April 13 to November 8. Large quantities of suckers were observed using the ladder in the spring.

Considerable damage was done along the northerly shore of the reservoir during the Hurricane of September 21. Coming at a time when the reservoir was full, due to accompanying record-breaking rains, it caused the waters of the reservoir to whip the shores. Much damage was done to the heavy riprap on the North Dike; to the light riprap at the Sawyer's Mills and Clarendon Mills fills; to the highway paving along the State Highway, Route 110, in Sterling and West Boylston; to the Boston and Maine Railroad embankment immediately south of the Oakdale depot, West Boylston and to the sand bank in West Boylston upon which the New England Power Company had erected a large steel tower carrying a double circuit 66,000-volt electric transmission line. The highway paving and embankments were repaired by the Department of Public Works, the railroad embankments by the Railroad company and protective works to the concrete foundations of the steel tower were built by the New England Power Company. At the Sawyer's Mills and Clarendon Mills fills Water Works forces repaired the light riprap with stones from neighboring stone walls for a distance of 3,010 linear feet, having an area of 2,185 square yards, at a cost of \$2,220.00. Repairs to the heavy riprap along the two miles of North Dike are to be made under Contract No. 85-M, which has been awarded to R. H. Newell Company of Uxbridge, at an estimated cost of \$9,450.00.

Contract No. 82-M was made with the Oliver Whyte Company of Medford on November 16, 1938 for the sum of \$4,865.00 for furnishing and attaching brass wire netting to the pipe rail fence on the promenade of the Wachusett Dam.

At the close of the year the company had its plans made for the fabrication of the materials which will be done in the shops in Medford. The entire contract is to be completed by May 15, 1939.

The Wachusett dam and adjacent structures and grounds have been given the usual care. A portion of the 24-inch pipe line in the grounds below the dam which carries water from the Wachusett Reservoir to the pumping plant of the town of Clinton at the former Lancaster Mills property was repaired by the town of Clinton by laying 525 linear feet of 12-inch cast-iron water pipe as a by-pass around an equal stretch of leaky 24-inch pipe.

Working conditions in the office headquarters were very materially improved by installing an air-conditioning system. This system forces the cool air from the water compartments in the basement of the building, through ducts, into the office headquarters. The system consists of a 24-inch motor-driven fan, driven by a 1 horse power motor with ducts, dampers and grilles. The total cost, including appliances and ducts, the cutting of walls and ceilings, finishing and painting, was \$729.76.

### *Sudbury Reservoir*

At the beginning of the year the water in Sudbury Reservoir was at elevation 257.38 or 1.62 feet below the crest of the spillway at the dam, which is at elevation 259.00. On January 3 the elevation dropped to 256.95 and varied to 259.15 until April 8. From April 8 to November 13 the flashboards were in place on the overflow and from November 14 to the end of the year the flashboards were off and the elevation of the water at the end of the year was 257.33 or 1.67 feet below the crest of the spillway at the dam.



Water was wasted from the reservoir over the spillway into Framingham Reservoir No. 3 from January 26 to 29, inclusive, March 18 and 19 and from July 21 to 29, inclusive. On account of the power station being out of service, water again flowed over the spillway from September 20 to October 5. The total flow over the spillway during the year was 1,291,700,000 gallons.

Water was by-passed at units Nos. 1 and 2 into the Weston Aqueduct from September 22 to October 10, while the power station was out of service due to power lines being damaged by the Hurricane of September 21. A total of 1,964,600,000 gallons was by-passed during this period. With the exception of the flow over the spillway and the water by-passed into Weston Aqueduct all of the water drawn from the Sudbury Reservoir was used to generate electricity.

The shores of the reservoir were kept clear of grass, weeds and debris; 19 truck loads of eel grass were removed from the shore of the Southborough arm of the reservoir and 4,800 pounds of chemical fertilizer was spread on the slope of the dam on the grounds below the dam.

The Water Works lands and structures at this reservoir were maintained in the usual manner.

#### *Framingham Reservoir No. 3*

At the beginning of the year the water in this reservoir was at elevation 184.70 and at the end of the year it was at elevation 184.27. The flashboards were kept in place on the overflow throughout the year. All of the water drawn through the Sudbury Aqueduct for supplying the town of Framingham and the Metropolitan Water District was taken from this reservoir, in which the water was maintained at a convenient elevation by discharging water into it from the Sudbury Reservoir, as required.

Water was wasted from this reservoir into the Sudbury River during the year at various times, totaling 9,170,600,000 gallons, of which 5,772,200,000 gallons was used to improve the quality of the water in the Sudbury Reservoir by allowing storage of water from the Wachusett Reservoir and 3,398,400,000 gallons was wasted due to sudden yield after heavy rainfall.

Chemical fertilizer was spread on the slope of the dam and all of the Water Works property at this reservoir was given the usual attention.

#### *Ashland, Hopkinton and Whitehall Reservoirs and*

#### *South Sudbury Pipe Lines and Pumping Station*

No water was drawn from the Ashland, Hopkinton or Whitehall reservoirs for consumption during the year but they were kept well filled with water and all of the water not required for that purpose was wasted. The South Sudbury Pipe Lines and Pumping Station were not used during the year as an ample supply of water of better quality was available from the Wachusett and North Sudbury watersheds. The pipe line to Framingham Dam No. 2 has been kept in readiness for use in case of emergency and the pipe line from the Hopkinton Reservoir to the Sudbury Reservoir was kept in readiness for use except that the chlorinator has been removed from this pipe line for use at another place.

The contract with the Marlborough Electric Company to furnish power at the Cordaville Pumping Station was cancelled on August 1 and between that date and the end of the year a portion of the electric equipment has been removed from the station and stored.

The Whitehall-Hopkinton pipe line was in use from January 1 to April 6 and from November 25 to the end of the year. During these periods a small flow was maintained to prevent freezing.

#### *Framingham Reservoirs Nos. 1 and 2 and Farm Pond*

At the beginning of the year the water in Framingham Reservoir No. 1 was at elevation 167.90 and varied from 169.98 on July 24 to 167.65 on November 19 or at an average of about 0.40 of a foot above the stone crest of the overflow. At the end of the year the water was at elevation 167.93.

At the beginning of the year the water in Framingham Reservoir No. 2 was at elevation 176.26 and varied from 177.74 on July 24 to 171.71 on September 18 or 0.12 of a foot above the stone crest of the overflow. At the end of the year the water was at elevation 176.23.

On account of the poor quality of the water in these reservoirs, they are no longer used for water supply purposes and the yield of their watersheds was allowed to waste over Framingham Dam No. 1 into the Sudbury River below the dam, including the usual flow of 1,500,000 gallons per day which was maintained every day in the year, as required by Acts of 1872, Chapter 177. A total of 37,550,000,000 gallons or an average of 102,877,000 gallons per day was so wasted. The maximum rate of waste for any day was 1,243,000,000 gallons on July 24.

The water in Framingham Reservoir No. 2 was drawn down to a low elevation during the early fall to allow the town of Ashland to clean the channel of the Sudbury River below Union Street.

At the beginning of the year the water in Farm Pond was at elevation 159.31 and varied from 161.34 on July 28 to 159.09 on May 12 or 0.20 of a foot above high water. At the end of the year the water was at elevation 159.35.

During the year the town of Framingham pumped 208,542,000 gallons of water from its filter galleries on the shore of Farm Pond and under legislative authority the Boston and Albany Railroad took approximately 25,040,000 gallons and the New York, New Haven and Hartford Railroad took approximately 5,280,000 gallons of water from the pond for use in locomotives.

Stop planks were kept in place at the outlet of the pond to elevation 159.33 throughout the year and a total of 164,200,000 gallons of water was wasted into the Sudbury River over the stop planks or an average of 450,000 gallons per day.

### *Lake Cochituate*

At the beginning of the year the water was at elevation 142.97 and varied from 145.75 on July 25 to 141.49 on October 1 or at an elevation averaging about 1.00 foot below high water. At the end of the year the water was at elevation 142.62.

No water was drawn from Lake Cochituate for water supply purposes during the year and to keep the water in the lake at the desired elevation the yield of the watershed was wasted through the outlet gate at the dam and for a short period in July, over the flashboards. A total of 9,762,800,000 gallons was wasted during the year or an average of 26,747,000 gallons per day.

The usual maintenance work was done to keep the Water Works property at the lake in satisfactory condition.

### AQUEDUCTS

The *Wachusett Aqueduct* was used on 287 days during the year, the total time in service amounting to 117 days, 18 hours and 29 minutes, and the quantity of water discharged from the Wachusett Reservoir into the aqueduct was 41,369,100,000 gallons, equivalent to an average draft of 113,340,000 gallons per day for the entire year and all of the water was used to generate electric energy at the Wachusett power station before it was discharged into the aqueduct.

During the year the Westborough State Hospital pumped 94,133,000 gallons of water from the aqueduct terminal chamber in Marlborough, equivalent to an average of 257,900 gallons per day.

Brush, grass and weeds were mowed and disposed of for a distance of 10 miles along the aqueduct at a cost of approximately \$296.00 per mile. About 10 cubic yards of rock which had spalled off the roof and side walls of the unlined portion of the tunnel was removed from the invert and packed into recesses in the side walls out of the path of the flowing water.

The *Weston Aqueduct* was in use 365 days, the total time in service amounting to 362 days, 3 hours and 18 minutes, and the total quantity of water drawn



from the Sudbury Reservoir into the aqueduct for delivery into the Weston Reservoir was 40,350,600,000 gallons, equivalent to 110,550,000 gallons per day. No measurable amount of water was wasted from the aqueduct during the year.

Test pits to allow examination of the outside of the siphon pipe were dug at the Sudbury River and Happy Hollow siphons. This work was done for the Metropolitan District Water Supply Commission.

Brush, weeds and grass were mowed and disposed of along the aqueduct right-of-way from gaging chamber No. 1 in Framingham to tunnel No. 4 in Weston and the regular work was attended to.

The *Sudbury Aqueduct* was in continuous use during the year except for two short periods of time to allow for inspection and cleaning. The aqueduct was shut down for the above purpose from 4:00 P.M. February 9 to 3:00 P.M. February 10 and from 4:00 P.M. March 6 to 4:00 P.M. March 8. The actual time the aqueduct was in use was 362 days and 1 hour. The entire supply for this aqueduct, 6,243,200,000 gallons, was drawn from Framingham Reservoir No. 3 and of this quantity 286,600,000 gallons was sold to the town of Framingham and 5,956,600,000 gallons, equivalent to an average of 16,319,000 gallons per day, was delivered to Chestnut Hill distribution reservoir. No water was diverted to Lake Cochituate from the aqueduct during the year with the exception of 2,700,000 gallons diverted while the aqueduct was shut off.

The aqueduct right-of-way was mowed and kept clean and the culverts were kept free from ice during the winter months.

The *Cochituate Aqueduct* was not used during the year but was kept in readiness for use in case of emergency.

All of the structures along the aqueduct have been given the usual care.

#### PROTECTION OF THE WATER SUPPLY

The Water Division has continued to use all the facilities available to safeguard the purity of the water delivered to the consumers. The vital need of water treatment is everywhere recognized and sanitary engineers, watchmen and skilled laborers were employed to enforce the Sanitary Rules and Regulations on the watersheds; to apply copper sulphate to the water in the reservoirs for removing objectionable tastes and odors due to microscopic organisms, and to apply chlorine and ammonia for sterilizing the water as it is distributed for consumption to the Water District.

Work in the laboratories consisted of making 4,145 tests for bacteria and 2,011 biological tests from samples collected throughout the Storage and Distribution Systems and 75 field tests for  $p^H$ , dissolved oxygen. Sixty-eight complaints from consumers on the Distribution System were investigated and most of these were found to be on account of taste and odor and many due to local conditions.

The entire cost charged to the work of sterilization and purification of water supplies during the year 1938 was \$34,185.00.

*Wachusett and North Sudbury Watersheds.* The Water Division forces have operated throughout the year filter beds and have also chlorinated water which was found to be polluted from small brooks and drains, before the water entered the reservoirs.

During the year 52,950 pounds of copper sulphate, at an approximate cost of \$2,270.00, was applied to the waters of Framingham Reservoir No. 3 and Sudbury Reservoir as an algacide to destroy microscopic organisms which included *Asterionella*, *Anabaena*, *Synura* and *Uroglenopsis* and at the Sudbury power station, the Sudbury Aqueduct and Framingham Reservoir No. 3 to prevent seeding of the organisms in the Weston Reservoir and Framingham Reservoir No. 3.

Thirty-four dwelling houses, one fruit stand and two cow pens were constructed on the Wachusett watershed during the year and special attention was given those situated near the water courses. The piggeries on the Wachusett watershed continue to be a serious menace. Some of the owners have moved piggeries further from the water courses but it may be necessary to take some

legal action against those owners of piggeries who are defiant and refuse to comply with the Sanitary Rules and Regulations.

On the North Sudbury watersheds which contribute directly to the water supplied for consumption, there were four dwelling houses and one large hen house built outside of the sewered district, one house in Marlborough and three in Southborough.

The Marlborough trunk sewer north of Farm Pond in Marlborough overflowed three times during 1938, once due to clogging of sewer and twice on account of the runoff from heavy rainfalls. The sewage that overflowed and the runoff from the brooks were chlorinated for several days. The Marlborough Brook filters overflowed five days during the year on account of excessive rainfall and all the overflow was treated with chlorine except for a few days during the Hurricane when the temporary chlorinator was out of commission.

There have been improvements in sanitary conditions on twelve places located on the North Sudbury watershed during 1938.

*Lake Cochituate and South Sudbury Watersheds.* The surface water from 700 acres along Pegan Brook and an intercepting ditch in Natick was purified by filters before it flowed into the water supply, with the exception of an overflow of 52,452,000 gallons at the Pegan Brook settling basin, and of 82,518,000 gallons from the intercepting ditch in Natick, following heavy rains, which was sterilized with chlorine before it entered the reservoir.

At the Pegan Brook filters, the pumping station was operated 321 days and 290,801,000 gallons of water was pumped to the filters, an average of 796,715 gallons a day for the entire year. The cost of operating the station and caring for the grounds and filter beds was \$8,237.14, which is at the rate of \$28.33 per million gallons filtered.

On the Cochituate and South Sudbury watersheds fewer sanitary inspections have been made on account of these supplies not being used for consumption in the Metropolitan Works.

*Distribution Reservoirs.* All the water drawn from the storage reservoirs during the year for use in the Water District was sterilized before it was delivered in the Distribution System. The water drawn through the Sudbury Aqueduct was sterilized in Sherborn near Leland Street at the Framingham boundary line, and the water drawn through the Weston Aqueduct was sterilized at the screen chamber at the outlet of the Weston Reservoir.

Anhydrous ammonia and chlorine were both used through the year. There was used 343,706 pounds of liquid chlorine and 89,382 pounds of anhydrous ammonia.

During the year there was used at the screen chamber in Weston 242,571 pounds of liquid chlorine, equivalent to 6.11 pounds to a million gallons of water and 60,355 pounds of anhydrous ammonia, equivalent to 1.52 pounds to a million gallons of water.

Portions of the water supply which had passed through open reservoirs, after the primary sterilization, were again sterilized with chlorine at the following places: Chestnut Hill Reservoir at Chestnut Hill Pumping Station; Waban Hill Reservoir at the Gate House; Fisher Hill Reservoir at the Gate House and Spot Pond Reservoir at the east Gate House.

Liquid chlorine was used during the year at all these places, with the exception of Spot Pond, where 4,508 gallons of sodium hypochlorite solution was used.

Improved brooks, channels, ditches, culverts and watering places were maintained in good order during the year.

Contract No. 127 was made with Hayes Pump and Machinery Company of Boston on July 5, 1938, for furnishing three manual control direct feed ammoniators, one with a maximum capacity of 100 pounds and two adaptable to either 35 or 100 pound capacity with the necessary parts required to operate at either maximum. All the ammoniators were provided with stainless steel equipment, including a 4-tank manifold and appurtenances.

These ammoniators were received July 14, 1938 at a total expenditure of \$1,680.00.



*Permits.* During the year written permits were issued to 1,857 inhabitants of the Metropolitan Water District and of the towns in which certain Water Division reservoirs are located, giving them the right to fish from the shores of the reservoirs under the conditions specified in the permits. Of these permits, 934 were for fishing in the upper portion of the Wachusett Reservoir, more than two miles above the outlet, and the remainder were for fishing in Whitehall Reservoir, Framingham Reservoir No. 2 and Lombard Mill Pond, from which no water was drawn for consumption.

### CLINTON SEWAGE DISPOSAL WORKS

The works constructed under the provisions of Acts of 1898, Chapter 557, for disposing of the sewage of the town of Clinton, were operated on 325 days during the year, the works being idle from September 22 to October 30, inclusive, pending repairs to the transmission line over which power for operating the pump is furnished from the Wachusett power station and which was seriously damaged during the Hurricane of September 21.

During this period the sewage overflowed at the pumping station but was adequately diluted with flood waters released from the Wachusett Reservoir. The quantity of sewage pumped and disposed of averaged 1,784,000 gallons per day. The cost of operating the pumping station was \$4,816.75, which is \$8.31 per million gallons, equivalent to \$0.167 per million foot gallons.

The settling tanks, sludge beds and filter beds have been used jointly during the year. Of the 579,752,000 gallons of sewage pumped to the filtration area, 269,104,000 gallons were applied to the 25 1-acre sand filter beds after the heavy portion had settled out into the settling tanks and the balance of 310,648,000 gallons was passed through the settling tanks and sludge beds before entering the brook tributary to the Nashua River. The dosing of the sand filters was equivalent to 62,508 gallons per acre per day for the 205 days on which the beds were used.

The cost of operating the filters and intercepting sewer was \$10,302.79, which is \$17.77 per million gallons of sewage disposed of.

### FORESTRY

In the Wachusett Section about 60 acres of land was prepared for planting by cutting all shrubs and sprouts, and about 75 acres of land was planted using approximately 86,800 three and four year red pine and white pine transplants for this work. 13,400 red pine and white pine transplants were used as replacements on previously planted lots.

In the Sudbury Section about 30,000 arbor vitae were set out on the marginal land of the reservoirs and in addition there were many mughus pines, spruce and hemlocks used as replacements on previously planted lots.

Areas used for fire guards were burned over in the spring and mowed over in the summer, and brush, weeds and grass disposed of by burning. The usual fire patrol service has been maintained on all watersheds during the spring and fall seasons but very few fires occurred on the Water Works lands during the year.

The usual work of caring for infested area on account of the gypsy moth and the pine tree weevil has been carried on and there was considerable work of spraying in order to suppress the saw-fly worm. At the Weston Reservoir, a tree blight disease was noticed in June on the spruce trees and a specimen was sent to the Massachusetts State College, Cedar Hill, Waltham, for analysis. They reported that the disease was caused by the fungus *Ascochyta piniperda* which becomes apparent in seedlings and on older spruce trees early in the spring while the tissues of the rapidly growing shoots and new leaves are succulent. The affected area of the shoot turns brown and shrivels and the leaves die and fall off. The shoot is weakened at the point of infection and the weight of the still healthy tip causes it to bend over. For a treatment pruning was suggested and also spraying with Bordeaux mixture.

The total expenditure for forestry in 1938 was \$36,328.08, of which \$5,711.03 was expended for protecting the trees from insects.

### HURRICANE

The Hurricane of September 21, 1938 caused great damage to the property and to the woodlands on the watersheds which are owned by the Water Division.

An Act providing funds for additional emergency work made necessary by the hurricane and floods was passed at the Extra Session of the Legislature in 1938 (Chapter 507) and made available \$100,000.00 for use of the Metropolitan Water District.

The following is an account of survey made after the Hurricane.

*Wachusett Section.* There was no damage done to the power plant or building at the dam but the plant was idle due to transmission lines of the New England Power Company being out of commission. The North and other small dikes were severely damaged by wave action requiring an expenditure of about \$15,000.00 to complete repairs. The Wachusett Aqueduct was out of service for one day on account of obstruction in the open channel due to fallen trees and the Clinton Sewerage System was out of service due to broken electric transmission lines and damage to motor at the pumping station. Slight damage was done to the building. Much damage was caused to the trees at the filter beds in Lancaster and it was estimated that about 250,000 board feet were blown down. Hundreds of acres of pine forests around the reservoir were ruined and much of the hardwood was also felled.

At the end of the year, the regular force, assisted by temporary men, had cleared about 40 miles of service roads throughout the marginal lands in order to reduce the fire hazard, and 10 miles of rivers and brooks had been cleared of the fallen trees in order to control the spring floods. Men are now at work clearing the 100-foot strip on Water Works land adjacent to the main highway as a protective measure against forest fires.

*Sudbury Section.* After the Hurricane subsided, a general survey was made of the conditions in the Sudbury Section and it was found that at the Sudbury Reservoir about 177 acres of woodland was either thoroughly or partially destroyed and about 80 acres around the other reservoirs and along the Sudbury, Cochituate and Weston Aqueducts.

The first work performed by the regular force was the opening of driveways and the clearing of fire lanes so as to give access to these districts in case of fire. The brooks, channels and rivers contributory to the reservoir were then cleared.

The work of clearing the lands was continued with the regular force, assisted by temporary men, cutting the damaged area into large lots with wide margins so that in case of fire it could be confined to a definite area.

At the end of the year the driveways around the reservoir and fire margins had been practically cleared and an additional 10 acres of pine forests were cleared on this watershed except for logging.

It was necessary to repair the following buildings in this Section: the office, garage, storehouse at the Sudbury Aqueduct, the house, barn and shed at Lake Cochituate, the Department house on the Weston Aqueduct and various other buildings around the reservoir where small repairs were necessary which was accomplished by our own regular force.

*Distribution Section.* Much damage was caused to the trees and shrubbery around the Distribution Reservoirs, particularly at Weston, Chestnut Hill and Spot Pond, where there was no mass destruction, except in spots where the trees were most exposed to the wind, especially on the northern side of the Weston Reservoir and the southern side of Spot Pond Reservoir.

At Chestnut Hill, several of the large, beautiful English elms around the Bradlee and Lawrence basins were destroyed.

Much time was spent immediately after the Hurricane by the Maintenance force in clearing the roadways and opening up the fire lanes and paths in the wooded areas around the reservoirs. The work has been continued since with



temporary men in addition to the regular Maintenance force and at the end of the year about one-half of this work had been accomplished.

*Pumping Stations.* The Boston Lightning Rod Company was employed to inspect and repair all the chimneys in connection with the Pumping Stations at an expenditure of \$950.00.

At Chestnut Hill the chimney on Station No. 2 was found to be in good condition but the top of the chimney on Station No. 1 was badly damaged and it was necessary to remove the old broken cast-iron cap and loose bricks, install a new reinforced concrete cap covered with lead and repair the lightning rod.

At Arlington Station the inspection showed that the iron cap on top of the chimney was broken and a number of the bricks were loosened. A new reinforced concrete cap covered with lead was installed and the lightning rod was also repaired.

At Hyde Park and Spot Pond stations inspection was made and the chimneys were found to be in good condition.

The Pumping Station buildings were more or less damaged. At Chestnut Hill Station No. 1 and No. 2 it was necessary to have emergency repairs done by our own force so as to protect the machinery in the pumping stations. This was done by our carpenter with helpers and consisted of milling lumber and building new doors for the tower leading to the coal shed roofs; renewing 41 pieces of reinforced plate glass in the skylights and building and erecting a temporary door replacing the 20-foot double doors on the southeast side of the coal shed which were damaged beyond repair.

A contract was made with John J. Hourihan for the sum of \$837.00 to make general repairs to buildings at Chestnut Hill Pumping Station.

#### HYDRO-ELECTRIC SERVICE

Contract No. 35-M provided for the sale of electric energy generated at the Wachusett Dam to the New England Power Company and Boston Edison Company and Contract No. 36-M provided for the sale of electric energy generated at the Sudbury Dam to the Boston Edison Company. Both of these contracts were to expire on March 1, 1939.

The Metropolitan District Water Supply Commission required electrical power for the construction of the pressure tunnel in Southborough. The only sources of electricity in this locality were the 66,000-volt transmission lines between the Wachusett and Sudbury dams owned by the Metropolitan District Commission and the systems of the Boston Edison Company and the New England Power Company.

The most economical source was the Metropolitan District Commission line but electricity was not available therefrom since the entire output of Wachusett and Sudbury power stations, except such as was required for station operation, had to be delivered to the New England Power Company and the Boston Edison Company under the above-named contracts.

The companies were willing that the electricity developed at the Wachusett and Sudbury power plants be available for the construction of the pressure tunnel in Southborough, and after conferences with representatives of the companies, new Contracts No. 86-M and No. 87-M, effective as of December 1, 1938, were executed. These contracts permit the use of the Wachusett and Sudbury power for proposed construction; permit the use of energy from the sources of the Boston Edison Company and the New England Power Company when the Wachusett and Sudbury power is not available or is deficient; provide for the return of such borrowed energy from subsequent generation at the Wachusett and Sudbury plants and provide for the sale to the companies on the same terms provided in the old contracts of all power not used for the proposed construction work. These contracts are for a ten-year period, terminable thereafter on six months' notice by either party.

The Metropolitan District Commission revenues derived from the sale of power will not be affected since the power used for the construction of the tunnel will be paid for by the Metropolitan District Water Supply Commission.

The old contracts were terminated on December 1, 1938.

The generation and sale of electric energy as a by-product in connection with the operation of the Metropolitan Water Works was provided for in Acts of 1895, Chapter 488.

The hydro-electric power stations at the Wachusett Dam in Clinton and at the Sudbury Dam in Southborough are operated by the water drawn for water supply from the reservoirs above these dams. During the year 14,019,890 kilowatt hours of electric energy was developed at the power stations.

The value of the energy delivered in 1938 at contract prices was \$85,878.12 and deducting \$54,647.09, the expenditures charged to the operation of both stations and the Water Division transmission line, there was a profit of \$31,231.03.

Wachusett Station

The 66,000-volt transmission line connecting the Wachusett and Sudbury stations was damaged during the Hurricane of September 21 and was repaired.

The power station was operated on 287 working days and 1 Sunday during the year, being idle on 20 days and all other Sundays and holidays on account of water requirements.

The statistics are as follows:

Total energy developed (kilowatt hours)	8,874,100	
Energy used at power station and storage yard (kilowatt hours)	33,811	
Available energy (kilowatt hours)		8,840,289
Water used (gallons)		41,369,100,000
Average head (feet)		97.97
Energy developed per million foot gallons (kilowatt hours)		2.197
Efficiency of station (per cent)		69.93
Credits:		
Energy sold New England Power Company and Boston Edison Company:		
8,620,942 kilowatt hours at \$0.00625	\$53,880.89	
Deduction of 2% as provided in contract:		
172,419 kilowatt hours at \$0.00625	1,077.62	
	\$52,803.27	
Energy furnished Clinton Sewerage Pumping Station:		
219,347 kilowatt hours at \$0.00625	1,370.92	
		\$54,174.19
Charges:		
Superintendence	\$1,624.65	
Labor, operating station	8,231.01	
Repairs and supplies	1,816.64	
Transmission line repairs and supplies	481.49	
	\$12,153.79	
Taxes	5,075.00	
Administration, general supervision, interest and sinking fund	11,092.08	
		28,320.87
Profit		\$25,853.32
Cost of available energy per thousand kilowatt hours		\$3.204

Sudbury Station

The Sudbury power station was operated on 351 days during the year; 345 days with three shifts, 5 days with two shifts and 1 day with one shift, although



for several days the station was shut down on account of repairs to damage caused by the Hurricane of September 21.

The statistics are as follows:

Total energy developed (kilowatt hours)	5,145,790
Energy used at power station (kilowatt hours)	73,162
Available energy (kilowatt hours)	5,072,628
Framingham Reservoir No. 3 service:	
Water used (gallons)	11,659,100,000
Average head (feet)	65.87
Weston Aqueduct service:	
Water used (gallons)	38,386,000,000
Average head (feet)	39.05
Energy developed per million foot gallons (kilowatt hours)	2.270
Efficiency of station (per cent)	72.3
Credits:	
Energy sold Boston Edison Company:	
5,072,628 kilowatt hours at \$0.00625	\$31,703.93
Charges:	
Superintendence	\$1,833.16
Labor, operating station	15,451.78
Repairs and supplies	516.47
	\$17,801.41
Taxes	2,170.00
Administration, general supervision, interest and sinking fund	6,354.81
	26,326.22
Profit	\$5,377.71
Cost of available energy per thousand kilowatt hours	\$5.190

DISTRIBUTION PUMPING STATIONS

At the five Distribution Pumping Stations, which are operated by steam power, 22,250,965,640 gallons of water was pumped during 1938. This is 197,871,936 gallons less than was pumped in 1937.

The pumpage at the two stations at Chestnut Hill, 16,423,272,615 gallons, was for use of the Southern High-service District only. Of this, 573,895,039 gallons was repumped at the Hyde Park Pumping Station for the Southern Extra High-service.

At the Spot Pond Station 4,437,466 gallons were pumped for the Northern High-service and at the Arlington Station 684,360,520 gallons were pumped for the Northern Extra High-service.

The electrically-operated Pumping Station in Belmont, which was put in service in 1937 for supplying the higher districts of Watertown, Belmont and Arlington has been in continuous service throughout the year; the total pumped being 392,441,000 gallons which were delivered to Watertown and Belmont only. At the station two hydraulic cone valves have been installed in place of 12-inch non-slamming checks which were installed when the station was built. This was necessary in order to eliminate the surges in the pipe lines due to the starting and stopping of the centrifugal pumps. These valves gave very satisfactory service during the latter part of the year.

During the year 7,707,827 pounds of bituminous coal, 756,431 pounds of anthracite screenings and 1,259,864 gallons of Bunker C fuel oil were burned at the five pumping stations operated by steam power.

In addition to the usual miscellaneous repairs made at all the stations to keep the equipment in dependable condition, many renewals and minor repairs have been made during the year.

Under Contract No. 80-M with the Hodge Boiler Works of East Boston, 392 tubes were replaced with new seamless steel tubes with rolled ends in Boiler No. 24 at the Spot Pond Station at a total expenditure of \$1,750.00.

Contract No. 81-M was made with the Lawrence Machine and Pump Corporation of Lawrence for furnishing ready for installation six centrifugal steam-turbine-driven pumping units for forcing circulation in water legs of six vertical fire tube boilers at Chestnut Hill stations, for the sum of \$2,310.00.

Contract No. 84-M was made with Green Fuel Economizer Co. Inc. of Boston for furnishing two fuel economizers and apparatus, one for each pumping station at Chestnut Hill, for the sum of \$8,060.00. The contract calls for the delivery of these economizers at the pumping station and the furnishing of supervision for the installation and disposal of old economizers.

### DISTRIBUTION RESERVOIRS

The locations, elevations and capacities of the distribution reservoirs of the Metropolitan Water Works are shown by the following table:

DISTRIBUTION RESERVOIRS AND LOCATIONS	Elevation of High Water <sup>1</sup>	Capacity in Gallons
Low Service:		
Spot Pond, Stoneham and Medford . . . . .	163.00	1,791,700,000
Chestnut Hill Reservoir, Brighton district of Boston . . . . .	134.00	300,000,000
Weston Reservoir, Weston . . . . .	200.00	200,000,000
Mystic Reservoir, Medford . . . . .	157.00	26,200,000
Northern High Service:		
Fells Reservoir, Stoneham . . . . .	271.00	41,400,000
Bear Hill Reservoir, Stoneham . . . . .	300.00	2,450,000
Northern Extra High Service:		
Arlington Reservoir, steel tank, Arlington . . . . .	442.50	2,000,000
Southern High Service:		
Fisher Hill Reservoir, Brookline . . . . .	251.00	15,500,000
Waban Hill Reservoir, Newton . . . . .	264.50	13,500,000
Forbes Hill Reservoir, Quincy . . . . .	192.00	5,100,000
Forbes Hill Standpipe, Quincy . . . . .	251.00	330,000
Intermediate High Service:		
Arlington Covered Reservoir . . . . .	320.00	2,000,000
Southern Extra High Service:		
Bellevue Reservoir, steel tank, West Roxbury district of Boston . . . . .	375.00	2,500,000
Total . . . . .	—	2,402,680,000

<sup>1</sup>Elevation in feet above Boston City Base.

The Mystic and Forbes Hill reservoirs have been kept full of water for emergency use but were not in actual service during the year.

The Bradlee Basin at Chestnut Hill Reservoir was in service throughout the year but the Lawrence Basin was out of service from June 4 to August 11 and from August 16 to the end of the year because of objectionable conditions in the water therein.

All the other Distribution Reservoirs and standpipes were in regular service throughout the year.

At Spot Pond Reservoir, the Department house which had been occupied by the attendant at the reservoir was thoroughly renovated inside and since late in December, it has been occupied by the General Foreman of the north district.

The old stable was partly demolished by removing the roof, loft floor and the front. A 15-foot extension was built on the back for use as a heating plant, storage room and men's room and a flat reinforced roof was installed over the entire structure with three rolling doors on the front.

All this work has been completed with the exception of the plastering on the inside of the structure and the stucco work on the outside.

### DISTRIBUTION PIPE LINES AND STORAGE YARDS

*Low-service Pipe Lines.* Contract No. 79-M with the West End Iron Works of Cambridge was for repairing girder of pipe bridge over Fitchburg Division of Boston and Maine Railroad in North Cambridge.

The 36-inch cast-iron pipe was removed from the existing pipe box and the



outside girder was replaced with a new one which had been fabricated in the shops. The inside girder is part of the bridge construction and maintained by the Railroad.

The work was completed at a total expenditure of \$1,775.00 which did not include the cost of removing and relaying the 36-inch cast-iron pipe which was done by the Maintenance force.

The tops and floors of the pipe boxes over the Boston and Maine Railroad at Walnut Street and Webster Avenue, Somerville, were removed, preparatory to making extensive repairs in 1939.

A 16-inch connection was made with the local system between the new supply main in Appleton Street and Main Street, Everett, in order to reinforce the local distribution system in the mercantile district.

Contract No. 83-M with the M. & R. Construction Company of Boston was for the rebuilding of timber bulkhead at Chelsea Creek Crossing, Marginal Street, Chelsea, for the sum of \$2,947.50.

Work under this contract began December 14, 1938 but progress was slow on account of the inability of the contractor to secure piles suitable for the work. At the end of the year the work of removing a section of the existing bulkhead had been completed.

*Northern High-service Pipe Lines.* On account of relocation of the Saugus Branch Brook under Main Street, Malden, it was necessary to extend the existing blow-off 20 feet in order to connect with the new culvert.

The reinforced bottom of the pipe box at the Saugus River Bridge in Saugus had disintegrated and was repaired by the National Guniting Contracting Company who were at work repairing the main bridge, at a cost of \$125.00.

*Intermediate High-service Pipe Lines.* The pipe yard at the Belmont Town Yard was maintained until late in 1938 when it was abandoned and the remaining stock returned to the Glenwood Yard, Medford.

A metered connection was made with the local service on Eastern Avenue and Highland Avenue, Arlington, but has not been put in service.

*Southern High-service Pipe Lines.* On December 27, 1938, a break occurred in one of the 24-inch southern high-service mains in Adams Street at Eliot Street, Milton.

The water from this break entered the basement of one building and washed away the surface of a large parking space. Most of the water, however, entered the Neponset River at the bridge a short distance from the break. As soon as the water had subsided, the maintenance crew commenced excavation over the break and it was found that the 24-inch pipe had cracked the entire length due to settlement on to rocks that had been exposed by leakage from the pipe line several years ago.

Approximately 270 yards of road surface was damaged which will be temporarily repaired until the weather permits permanent repair.

*Southern Extra High-service Pipe Lines.* At Vose Avenue in the Hyde Park District of Boston a new highway has been built and due to the necessity of lowering the 12-inch main at this location it was thought advisable to duplicate this line across the new highway with a 16-inch main. This made necessary the laying of 220 linear feet of 16-inch pipe and the relaying of 238 linear feet of 12-inch main.

*Breaks and Leaks.* One break and thirty leaks occurred on the mains of the Distribution System during the year. These were repaired at a cost of

\$432.72 for the break, which did not include damages, and \$3,406.31 for the leaks. Five of these leaks were from defective wooden insulation joints, two on service pipes to meter registers, three from compound joints and twenty from lead joints.

*Recording Gages.* Pressure gages have been maintained at 40 locations on the Distribution System and tables in the Appendix show the hydraulic grade at 18 of these stations, as determined by the recording charts.

*Regulating Valves.* There are 9 pressure regulating valves connected with the system, 7 of which are in constant use for reducing pressure of water supplied to Revere, Swampscott and Winthrop. The others are kept in good condition for emergency use.

*Glenwood Yard.* Under Contract No. 77-M with the Atlantic Roofing and Skylight Works of Boston for repairing roofs of buildings at Glenwood Yard, Medford, the two main buildings were thoroughly repaired.

On the main office building existing copper gutters and conductor pipes and the copper valleys on dormer windows were renewed and all flashing and copper ridges were refastened.

On the blacksmith's shop building the existing copper conductor pipes were renewed and securely fastened to the building. The copper ridges were refastened to the building and 8 feet of new copper ridge installed.

On both buildings all broken, cracked and chipped slate, including slate damaged during progress of repairing, was replaced with non-fading blue slate to match the existing color.

The work under this contract was completed at a total expenditure of \$1,267.00.

*Chestnut Hill Yard.* Contract No. 78-M with Groisser & Shlager Iron Works of Somerville was for replacing stiff-leg derrick at Chestnut Hill Pipe Yard, Boston.

Under this contract the work consisted of taking down the existing wooden stiff-leg derrick and installing an all steel stiff-leg derrick of 10-ton capacity on existing foundation. The work in connection with the fabrication of this derrick continued throughout the winter in the shops of the firm.

The work under this contract was completed at a total expenditure of \$2,525.00 and the derrick tested on August 27, 1938.

Pipe, specials and other materials and supplies required for the maintenance and operation of the pipe lines are kept on hand at the Glenwood Yard in Medford and the Chestnut Hill Yard in Brighton.

Auto trucks equipped with gate-operating attachments have been maintained at Glenwood and Chestnut Hill Yards and men have been kept on duty day and night ready to operate them in case of emergency. A third auto truck properly equipped is also maintained at the Mystic Shops in Somerville for emergency service.

#### DISTRICTS SUPPLIED

The Water District includes 20 municipalities having an area of 174 square miles and an estimated population as of July 1, 1938 of 1,585,150. Of this number 18 municipalities are regularly supplied with water from the Metropolitan Works.

*Measurement of Water to Municipalities.* There are now 96 Venturi meters varying in size from six to sixty inches in diameter in the distribution lines. Seventy-seven of these are on connections supplying the various cities and towns in the Metropolitan Water District.



Of the 87 meter registers connected with the Venturi meters on the Distribution System on December 31, 1938, there were 57 Type D, 5 Type M and 25 Type Y register-indicator recorders.

In addition to the Venturi meters there are 13 detector meters and 2 disc meters measuring to the District.

*Consumption of Water.* The consumption of water in the 18 cities and towns supplied from the Metropolitan Works during the year was 47,515,964,000 gallons, equivalent to a daily average of 130,180,700 gallons, which on the basis of an estimated population of 1,465,970 is equivalent to 89 gallons per capita.

The average daily consumption in the several districts supplied was as follows:

Districts	Gallons per Day	DECREASE FROM 1937	
		Gallons per Day	Per Cent
Low-service . . . . .	66,864,900	1,073,100	1.58
Southern High-service . . . . .	45,771,300	763,400 <sup>1</sup>	1.70 <sup>1</sup>
Intermediate High-service . . . . .	1,065,000	202,600	15.98
Northern High-service . . . . .	12,903,800	367,400 <sup>1</sup>	2.93 <sup>1</sup>
Southern Extra High-service . . . . .	1,636,800	236,600	12.63
Northern Extra High-service . . . . .	1,938,900	278,400	12.56
Total District supplied . . . . .	130,180,700	659,900	0.50
Brookline and Newton . . . . .	9,223,700	229,800	2.43
Total District . . . . .	139,404,400	889,700	0.63

<sup>1</sup> Increase.

There has been an increase in the consumption in five cities and four towns during the year but a decrease in the district supplied of 659,900 gallons per day or 0.45 of a gallon per capita.

The following table shows the daily per capita consumption of water in the cities and towns in the Metropolitan Water District for the year 1938:

City or Town	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Arlington . . . . .	56	51	50	50	50	57	50	52	51	51	49	48	51
Belmont . . . . .	48	47	47	47	48	56	49	55	53	52	48	47	50
Boston . . . . .	109	105	101	96	96	104	106	113	105	107	104	110	105
Chelsea . . . . .	77	77	74	71	68	72	77	82	80	79	79	79	76
Everett . . . . .	95	93	91	86	88	94	97	105	112	101	96	97	96
Lexington . . . . .	54	52	53	56	60	70	60	62	63	58	55	54	58
Malden . . . . .	71	71	72	71	70	72	72	75	73	72	72	70	72
Medford . . . . .	51	53	54	54	53	55	53	54	53	54	53	53	53
Melrose . . . . .	55	57	56	54	55	60	57	61	61	61	57	56	57
Milton . . . . .	49	52	53	53	55	55	47	48	48	51	52	52	51
Nahant . . . . .	115	89	84	81	86	130	152	162	120	81	73	60	103
Quincy . . . . .	49	47	48	47	48	51	50	54	51	51	51	49	50
Revere . . . . .	61	59	58	60	63	65	68	72	63	58	57	57	62
Somerville . . . . .	96	95	92	88	89	95	95	101	89	92	92	91	93
Stoneham . . . . .	59	58	60	60	60	62	59	62	63	60	58	58	60
Swampscott . . . . .	51	51	52	61	66	78	78	84	82	68	62	64	66
Watertown . . . . .	56	56	56	54	55	60	56	59	59	62	59	57	57
Winthrop . . . . .	73	65	63	64	68	79	94	96	86	79	69	72	76
Metropolitan District . . . . .	91	89	86	83	83	89	90	96	90	90	88	91	89

The city of Newton was furnished with 770,000 gallons of water from the Metropolitan Works which the city is entitled to free of charge under the agreement made in 1900.

The consumption for the town of Brookline was 1,686,125,000 gallons divided into two services, the high-service 1,289,946,000 gallons and the extra high-

service 396,179,000 gallons equivalent to 88 gallons per capita per day, of which 23,620,000 gallons were delivered to the high-service from the Metropolitan Works.

The average daily consumption of water in each of the municipalities in the Metropolitan Water District during 1937 and 1938 is as follows:

	Estimated Popula- tion, 1938	AVERAGE DAILY CONSUMPTION				
		1937		1938		Decrease in Gallons
		Gallons	Gallons per Capita	Gallons	Gallons per Capita	
Arlington . . . . .	40,350	2,375,900	60	2,072,400	51	303,500
Belmont . . . . .	27,090	1,391,300	53	1,346,300	50	45,000
Boston . . . . .	844,630	88,144,700	105	88,391,900	105	247,200
Chelsea . . . . .	40,350	3,030,700	74	3,083,900	76	53,200
Everett . . . . .	46,360	4,790,400	103	4,460,500	96	329,900
Lexington . . . . .	11,800	652,700	57	685,500	58	32,800
Malden . . . . .	56,720	3,951,300	69	4,069,900	72	118,600
Medford . . . . .	62,710	3,211,200	52	3,344,300	53	133,100
Melrose . . . . .	25,070	1,450,600	58	1,440,900	57	9,700
Milton . . . . .	19,420	1,043,300	55	994,100	51	49,200
Nahant . . . . .	1,830	227,300	126	188,000	103	39,300
Quincy . . . . .	80,540	4,628,500	58	4,012,500	50	616,000
Revere . . . . .	35,050	2,232,800	64	2,161,200	62	71,600
Somerville . . . . .	98,450	9,077,600	92	9,146,600	93	69,000
Stoneham . . . . .	11,410	623,000	55	683,600	60	60,600
Swampscott . . . . .	10,570	718,500	68	701,900	66	16,600
Watertown . . . . .	36,510	2,091,800	58	2,099,200	57	7,400
Winthrop . . . . .	17,110	1,199,000	70	1,298,000	76	99,000
District Supplied . . . . .	1,465,970	130,840,600	90	130,180,700	89	659,900
Brookline . . . . .	52,410	4,730,500	91	4,619,500	88	111,000
Newton . . . . .	66,770	4,723,000	71	4,604,200	69	118,800
Total District . . . . .	1,585,150	140,294,100	89	139,404,400	88	889,700

<sup>1</sup>Increase.

The population, consumption of water and per cent of services metered in the Metropolitan Water District as supplied in 1938 and for the period from 1890 to 1938, inclusive, are shown graphically by the accompanying diagram.

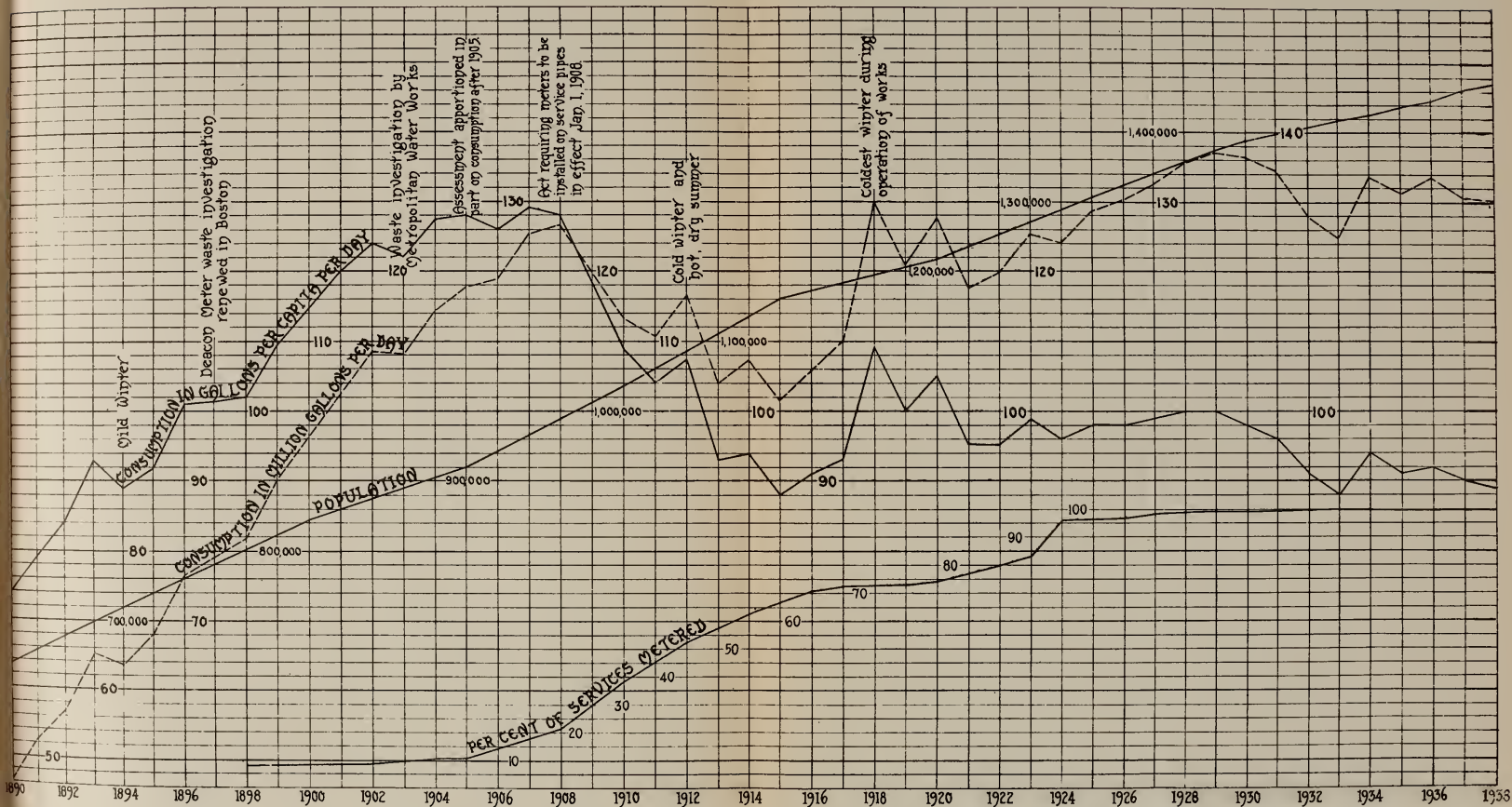
The consumption by districts in 1938 as compared with 1937 is as follows:

	Gallons per Day 1938	DECREASE FROM 1937	
		Gallons per Day	Percent- age
Low service district, embracing the low-service districts of Arlington, Belmont, Boston, Chelsea, Everett, Malden, Medford, Somerville and Watertown . . . . .	66,864,900	1,073,100	1.58
Southern high-service district, embracing Quincy, the high-service district of Boston, except East Boston, and portions of Milton and Watertown . . . . .	45,771,300	763,400 <sup>1</sup>	1.70 <sup>1</sup>
Intermediate high-service district, embracing portions of Belmont and Watertown . . . . .	1,065,000	202,600	15.98
Northern high-service district, embracing Melrose, Nahant, Revere, Stoneham, Swampscott and Winthrop and the high-service districts of Chelsea, East Boston, Everett, Malden, Medford and Somerville . . . . .	12,903,800	367,400 <sup>1</sup>	2.93 <sup>1</sup>
Southern extra high-service district, embracing the higher portions of Hyde Park, Milton and West Roxbury . . . . .	1,636,800	236,600	12.63
Northern extra high-service district, embracing Lexington and the higher portions of Arlington and Belmont . . . . .	1,938,900	278,400	12.56
District Supplied . . . . .	130,180,700	659,900	0.50
Brookline and Newton . . . . .	9,223,700	229,800	2.43
Total District . . . . .	139,404,400	889,700	0.63

<sup>1</sup>Increase.



POPULATION, CONSUMPTION OF WATER <sup>AND</sup> PER CENT OF SERVICES METERED  
 IN THE  
 METROPOLITAN WATER DISTRICT  
 AS SUPPLIED IN 1938  
 FROM 1890 TO 1938



Note: Estimated population and consumption per capita given on diagrams published in previous annual reports are revised from time to time as regular census figures become available.





# WATER FROM METROPOLITAN WATER WORKS SOURCES USED OUTSIDE OF THE METROPOLITAN WATER DISTRICT—1938

PLACES WHERE WATER IS USED	Total Quantity (Gallons)	Average Quantity (Gallons per Day)	Amount Charged
Town of Rutland . . . . .	83,355,200 <sup>a</sup>	228,400	—
Town of Holden . . . . .	27,014,300 <sup>b</sup>	74,000	—
Town of Clinton . . . . .	—	—	—
Town of Lancaster . . . . .	—	—	—
Town of Sterling . . . . .	5,854,000 <sup>c</sup>	16,000	—
Westborough State Hospital . . . . .	94,138,000	257,900	\$2,824.14
Town of Westborough . . . . .	75,000,000	205,400	—
Town of Southborough . . . . .	44,810,000	122,700	—
Town of Ashland . . . . .	101,284,440	277,400	—
Town of Hopkinton . . . . .	30,618,200	83,800	—
Town of Framingham . . . . .	488,343,000	1,337,900	11,592.43
Town of Natick . . . . .	326,000,000	893,100	—
United States Army Reservation at Peddock's Island in Hull . . . . .	572,000 <sup>d</sup>	1,600	69.00
Portion of Town of Saugus . . . . .	2,797,000 <sup>e</sup>	7,700	—
Metropolitan Parks, Middlesex Fells and Revere Beach Divisions . . . . .	6,395,000	1,800	—
Walter E. Fernald State School and Metropolitan State Hospital . . . . .	164,956,000 <sup>f</sup>	451,900	17,839.99

NOTES:—Water was used throughout the year in all places except as noted.  
The average daily use is in all cases figured on basis of 365 days.  
<sup>a</sup>All water was diverted from the watershed.  
<sup>b</sup>224,400 gallons diverted from the watershed.  
<sup>c</sup>1,026,000 gallons diverted from the watershed.  
<sup>d</sup>Water supplied by the Commission through City of Quincy pipes, and by agreement revenue is divided in equal shares between the City and Commonwealth.  
<sup>e</sup>The City of Melrose supplies the water and pays the Commonwealth by an addition to its regular apportionment.  
<sup>f</sup>For fiscal year ending November 30.

VIII. Metropolitan Sewerage Districts

AREAS AND POPULATIONS

The population of the districts, as given in the following table, are based on the census of 1935.

Table showing Ultimate Contributing Areas and Present Estimated Populations within the Metropolitan Sewerage Districts, as of December 31, 1938

CITY OR TOWN		Area (Square Miles)	Estimated Population	
North Metropolitan District	Arlington . . . . .	4.73	40,600	
	Belmont . . . . .	3.78	28,240	
	Boston (portions of) . . . . .	3.45	95,370	
	Cambridge . . . . .	5.43	121,810	
	Chelsea . . . . .	2.07	40,010	
	Everett . . . . .	2.92	46,230	
	Lexington . . . . .	15.98	11,940	
	Malden . . . . .	4.16	56,640	
	Medford . . . . .	6.11	62,900	
	Melrose . . . . .	3.81	25,180	
	Reading . . . . .	9.76	11,490	
	Revere . . . . .	5.55	35,020	
	Somerville . . . . .	3.96	98,120	
	Stoneham . . . . .	4.27	11,500	
	Wakefield . . . . .	6.36	16,640	
	Winchester . . . . .	5.31	13,920	
	Winthrop . . . . .	1.61	17,130	
	Woburn . . . . .	12.23	19,920	
		101.49	752,660	
South Metropolitan District	Boston (portions of) . . . . .	24.96	337,710	
	Braintree . . . . .	13.44	18,300	
	Brookline . . . . .	5.35	52,700	
	Canton . . . . .	17.84	7,090	
	Dedham . . . . .	9.66	15,570	
	Milton . . . . .	9.59	19,600	
	Needham . . . . .	11.44	12,650	
	Newton . . . . .	16.00	66,860	
	Norwood . . . . .	10.16	16,020	
	Quincy . . . . .	11.46	81,060	
	Stoughton . . . . .	16.23	8,710	
	Walpole . . . . .	20.81	7,890	
	Waltham <sup>1</sup> . . . . .	11.40	44,580	
	Watertown . . . . .	3.83	36,610	
	Wellesley . . . . .	9.89	15,000	
	Weymouth . . . . .	16.46	22,480	762,830
		208.52		
Totals		310.01	1,515,490	

<sup>1</sup>Including 2908 in the Metropolitan State Hospital and the Middlesex County Tuberculosis Hospital authorized by Chapter 372 of the Acts of 1928 and Chapter 373 of the Acts of 1929.

Metropolitan Sewers

SEWERS PURCHASED AND CONSTRUCTED AND THEIR CONNECTIONS

During the year there have been 0.208 miles of Metropolitan sewers built within the sewerage districts, so that there are now 151.417 miles of Metropolitan sewers. Of this total, 9.642 miles of sewers, with the Quincy Pumping



Station, have been purchased from cities and towns of the districts. The remaining 141.775 miles of sewers and other works have been constructed by the Metropolitan Boards.

The locations, lengths and sizes of these sewers are given in appendix tables, together with other data referring to the public and special connections with the systems.

## Maintenance

### SCOPE OF WORK AND FORCE EMPLOYED

The maintenance of the Metropolitan Sewerage System includes the operation of 10 pumping stations, the Nut Island screen-house and 151.417 miles of Metropolitan sewers, receiving the discharge from 2161.33 miles of town and city sewers at 1488 points, together with the care and study of inverted siphons under streams and in the harbor.

At present the permanent maintenance force consists of 196 men, of whom 117 are employed on the North System and 79 on the South System. These are subdivided as follows: North Metropolitan System, 77 engineers and other employees in the pumping stations and 40 men, including foremen, on maintenance, care of sewer lines, buildings and grounds; South Metropolitan System, 53 engineers and other employees in the pumping stations and 26 men, including foremen, on maintenance, care of sewer lines, buildings and grounds.

The regular work of this department, in addition to the operation of the pumping stations, has consisted of routine work of cleaning and inspecting sewers and siphons, caring for tide gates, outfall sewers, regulators and overflows, measuring flow in sewers, inspection of connections to the Metropolitan sewers, and the care of pumping stations and other buildings, grounds and wharves.

In addition to these regular duties, other work has been done by the maintenance employees in this department as follows:

### DEER ISLAND PUMPING STATION

On No. 4 Engine, the intake and discharge bends connecting with the low pressure cylinder, together with one cylinder head, the piston, piston rod and the cylinder itself, were removed and two new gaskets were put in between the cylinder and the other head and the removed parts reassembled. This work was done by contract with the assistance of men at the station.

The use of the venturi meter has been discontinued for years. In the pit in which it was located, oily water, grease, etc. accumulated which was disagreeable to work in and a nuisance to clean out. A 12" drain pipe was laid from the siphon pit in the well of No. 4 pump through to the meter pit and an upright pipe extended to the level of the basement floor to take off any water which had collected there. The opening between the well and the meter pit was then blocked off by a brick bulkhead and the meter pit filled with sand and covered with a concrete floor at the basement floor level. This work was done by an outside contractor.

The salt water well furnishing condensing water for Nos. 1 and 2 engines has been thoroughly cleaned by the maintenance men from the East Boston Yard. The repairs and setting up of the economizer was done by maintenance men from the station and the East Boston Yard superintended by a man sent by the firm that furnished the new sections for the economizer. The latter is located at the rear of the boilers in a restricted space and in order to avoid inconvenience in handling and the danger of breaking the tubes, a slot 2 feet wide and 12 feet high was cut through the boiler room wall and the tubes were handled through it. This slot was covered when the work was finished by a metal panel lined with asbestos and bolted to the outside of the wall so that it may be removed for future cleaning of the economizer or replacement of the tubes.

On the beach the walls of the outer well on the suction pipe for condensing water for Nos. 1 and 2 engines have been built up approximately 5 feet and a

plank cover installed and the cracks between the planks have been caulked to keep out sand. This work was made necessary by the filling in of the beach at this point. A well has also been constructed at the end of the blow-off pipe from the boilers just outside of the sea wall to prevent the end of the pipe being buried in the sand as occasionally occurs during storms. An overflow pipe has been left on the beach side 3 feet above the beach to relieve pressure on the end of the blow-off in case drainage from the bottom of the manhole is shut off. The maintenance men from the East Boston Yard did a large part of the work of excavating, setting forms and placing of the concrete in the manhole on the beach.

The carpenters and the roofer made repairs to the gutters and slate roof of the station, replaced two windows in the screen room and put in four new sashes in the wash room. Repairs to the coal run were made by adding new planking and a diagonal brace.

The roofer made repairs to the slate roof of the four apartment dwelling which was damaged by the hurricane of September 21st., and the carpenters repaired the upper hall doorway of one of the tenements, reshingled the barn and repaired damage done to the boathouse by the hurricane.

The carpenters have put in a partition in the old dynamo room and added shelves to make a storeroom for pipe fittings, spare parts, rods, etc. They have replaced the sheathing along the southerly wall of the station for a considerable distance with new sheathing from the floor to the elevation of the bottom of the windows as the old sheathing had become badly warped and in some places decayed and have also built additional lockers to hold oil cans, tools, etc.

#### EAST BOSTON PUMPING STATION

Eight new springs and valves were installed in the condenser pump of No. 1 Engine.

A new pipe and check valve have been put in for the siphon in No. 2 pit.

New Tripp's packing has been installed on the High Pressure Cylinder of No. 3 Engine and the cylinder head was removed and six new expansion springs put in to center the piston. A special piece of extra heavy 4" cast-iron pipe about four feet long was put in the line from the air pump to the condenser.

Twelve new valves and springs were put in No. 4 air pump and new plungers in No. 3 air pump. A new discharge line was put in on No. 4 siphon. Two new boilers Nos. 2 and 4 have been installed. To allow these boilers to be brought in, the door between the boiler room and the coal pocket and some of the surrounding masonry had to be removed. The carpenters have put in a new door frame and doors so arranged that they can be quite easily removed and it will not be necessary in the future to tear down any brickwork when new boilers are to be installed.

A new door has been put in each of the flues to assist in ventilation and cooling when these are being cleaned. The flues have been cleaned.

The covering of the new boilers was done by the company that furnished them.

Nos. 1 and 6 boilers have had cracks around the fire doors which had to be welded.

The economizer has been taken apart and the tubes turbed and washed out and then put back in commission.

Thirty-eight new steam nozzles have been put into the waste washing machine.

New clamps have been added on the oil lines of Nos. 1 and 2 engines.

New pipes containing lighting wires have been attached to No. 2 boiler and lights installed for lighting the water columns and gauges. A couple of lengths of new pipe have been put into the piping of the Holly System above the receiver.

The two strainers on the condensing water suction pipes were thoroughly cleaned.



A pump bought early in the year has been set up and connections completed. It pumps the water used in cooling the thrust bearings of the pumps and such additional water as is necessary to supply the boilers. It is provided with a float connection in the tank which operates the throttle valve so that the necessary rate of pumping is practically automatically controlled.

Outside contractors have replaced lightning rods and done some pointing of masonry on the easterly chimney of the station.

### *Charlestown Pumping Station*

New extra heavy steam piping has been put in between the steam main and Nos. 1 and 2 boilers and the valves on these lines have been reseated and put in good repair.

Eighty-five feet of new 7-inch iron pipe has been put in the discharge line from the condensers of Nos. 1 and 2 engines, replacing the old pipe.

Ninety feet of new 2½-inch cast-iron pipe has been put in for the discharge from the pit siphons.

The main shaft bearing on the governor of No. 3 engine has been reseated and a new ball bearing installed.

New bearings have been put in on the No. 3 condenser pump and the plungers rebabbitted.

The salt water well has been cleaned and the discharge gauge manhole has been cleaned and a new iron ladder put in.

The basement of the station has been painted and a drain discharging water from the screen room repaired and equipped with a new strainer.

### *Alewife Brook Pumping Station*

On the high pressure end of No. 3 Engine, new valve stems have been made and installed and new stud bolts have been made and put in on the drive wheel and the wheel keyed up. New brass boxes including wrist pin and crank bearings were also installed. A new blow-off pipe has been put in on No. 1 boiler and the damper repaired.

A new heating coil has been made and hung on the wall at the southeast corner of the station.

A small radiator has been placed on the platform between the door of the engine room and the desk of the Engineer in charge.

A ventilator has been built on the roof of the engine room.

### *Reading Pumping Station*

On the larger pump, the shaft and bearings being badly worn, the shaft was removed and turned true and the bearings rebabbitted and refitted. The shaft was cut and an additional coupling put in which made it possible to do the work at our shop at East Boston and also will facilitate future repairs. Similar work was done on the smaller pump after the larger pump was back in operating condition. It was found that some additional work was also necessary at the connection with the pump and this has been done.

A cast-iron oil retainer has been made and fitted to prevent the oil being thrown out around the pit from the lower bearing of the smaller pump.

### *Sewer Lines*

The maintenance men at East Boston have removed the ten-inch vertical portion of the suction pipe for the condensing pumps at the westerly end of the East Boston Pumping Station and replaced it with a twelve-inch pipe. A perforated pipe strainer has been placed in the cross at the top of the pipe so that it can be removed and cleaned at any stage of the tide.

The rip-rap around the Winthrop head-house of the siphon at Shirley Gut has been repaired. Part of this work was due to the hurricane on September 21st.

The rip-rap at Belle Isle Inlet has also been repaired.

On Lowell Street in Arlington, the sewer settled and broke over the culvert put in by the Town several years ago. About 38 feet of sewer pipe was relaid on a reinforced concrete beam foundation with the hope that further settlement will be prevented. The greater part of the excavation and refilling was done by an outside contracting company while the removal and replacing of the old pipe was done by our maintenance men.

The float and regulator arm were removed from the chamber at Spruce Street, Chelsea and repaired. New brass bushings and bolts were put in and it was put back in position and is now working satisfactorily.

A new shed for the storage of lumber under cover has been built in the southwest corner of the yard on Addison Street, East Boston. It will also guard against theft.

Screen door frames and window screen frames have been made for Charlestown Pumping Station, ready for the screen wire to be put on.

A new outside door has also been made for the room over the economizers at Ward Street Pumping Station.

At East Boston, the roof of the Field Office (formerly at Cross Street Yard) blown off by the hurricane, has been repaired and the office has been repainted.

Fourteen feet of 3" iron pipe was used to replace a leaking downspout pipe from the roof of the carpenters' shop.

At Alewife Brook barn, partitions were altered to make room for a shower bath.

A new field office has been built in Watertown by carpenters from the East Boston Yard and equipped with water supply and waste pipes, electricity for lighting, telephone, oil heating, furniture lockers, etc.

The sewer line of Sections 107 and 108, North Metropolitan Relief Sewer in Medford, including the siphon, where it crosses Meetinghouse Brook, and the manholes, has been cleaned and the slopes at the siphon repaired and graded. Vertical screens have been set up in the stop-plank grooves at the upstream end of the siphon at Meetinghouse Brook to prevent material from lodging on the lower screens.

Sods were carted from Magazine Beach, Cambridge, to the Brooks Estate in Medford for restoring the surface over recent sewer excavations.

The building and gauge, near Mystic Valley Parkway, on Section 108, for the use of the engineer from the Department of Health, has been removed.

A drain which was cut off during the construction of the North Metropolitan Relief Sewer in Winchester near Manchester Field has been reopened for service.

An 18" relief pipe was constructed connecting the old Metropolitan Sewer, the Reading Extension Sewer and the new Relief Sewer at the third manhole on the original sewer downstream from Montvale Avenue, Stoneham.

At the Owen property on Section 115A, Stoneham, where the foundation of the steps and walk had moved and the foundation wall of the house cracked, repairs were made. The steps were replaced on new foundations. The concrete walk was replaced, the foundation walls pointed up and the bank regraded.

#### *Ward Street Pumping Station*

A drying room for washed wiping rags was built in a corner of the main floor, of wood, insulated and lined inside with iron sheets. It has steam pipes and a blower and was built by the maintenance men.

The economizer has been taken down, the tubes and bends cleaned, and a defective tube replaced.

The engineer in charge installed, with his own men, changes in the oiling systems in No. 1 and 2 pumps. These changes will obviate the necessity of using two oilers when two pumps are running at the same time.

The check valve installed originally on the 36" force main from No. 3 pump did not open wide enough and so there was a pressure loss of eight pounds in passing through. Our carpenter shop in East Boston undertook and successfully completed the very difficult job of making the pattern for this new valve, which was later cast at a local foundry and is now in use.



*Braintree-Weymouth Pumping Station*

Partitions to form an office for the Engineer in charge of the station were put up by the carpenters. This work was finished in September.

*Sewer Lines*

Repairs to the Superintendent's office at the Ward Street Yard consisted of the replacing of the wooden sills and floor beams with concrete sills and floor slabs and covering the floor with linoleum, cemented down. A cellar under this office was also built for additional and safer storage space.

The men from the Hyde Park Yard have gone to Quincy several times to shovel coal and cut the lawns.

Nine manholes which had become covered were raised so as to be visible and available for use.

Upon further complaint by the owner of a small skating pond upon his property in Milton which he claimed had not been restored to its original condition after the construction of the sewer nearby, the pond was pumped out, cleaned of foreign materials and whatever damage had been done to it repaired so that in all probability the grass, reeds and rushes will not reappear for several years.

In Milton, where the high-level sewer crosses Brush Hill Road, the State Department of Public Works has constructed a Highway, which at this point consists of the widening of Brush Hill Road. The Contractor has reinforced the Metropolitan sewer by a superimposed yoke of reinforced concrete as requested by this Division.

A considerable amount of snow was dumped by the City workmen during the month of January into the Metropolitan sewer manholes. This dumping is occasionally inspected by our Superintendent but as the work is sometimes carried on continuously for twenty-four hours, he admits that he cannot cover it as thoroughly as could be wished.

During the heavy rains in July, the maintenance forces of the South System have done a great deal of work in patrolling the sewer lines, measuring the storm flow, and watching for washouts and other damage. In addition to the established overflows, a considerable amount of sewage has overflowed the tops of various manholes, finding its way into the Neponset and Charles Rivers. With the exception of a single manhole which overflowed in the floods of February 1936, this is the first time that manholes in the South System have overflowed, excepting overflows caused by blocking of the sewer.

The overflowing of the Charles River sewer, caused by the heavy rainfall in July, continued during part of the month of August. The very considerable overflow from the Galen Street siphon continued until August 16, when the Town of Watertown was finally persuaded that this overflowing was caused, not by the height of water in the Metropolitan sewer, but by blocking of the siphone itself, and the sewer department cleared its line.

A considerable number of complaints were received of odors which were assumed to be caused by the Metropolitan sewer. Each one of these odors turned out to be caused by mud deposits left by receding river waters.

A considerable amount of work was done in late September, clearing up hurricane damage at the stations and over the lines. This work was financed from the budget, no hurricane appropriation was sought.

The road to the Nut Island Screen House, from Sea Avenue and including the circle by the boat house, was surfaced by an outside contractor.

The old horse "Major" at Ward Street Yard died on December 3. There are now no horses in the Sewerage Division.

Repairs were made to a section of sidewalk on Tremont Street, above Cufflin Road, Brighton. Several sections of granolithic were broken out and the cavity filled with cinders. The sidewalk is now safe but the surfacing has not yet been replaced.

## GASOLINE IN PUBLIC SEWERS

During the year the usual precautions have been maintained against the introduction of gasoline into the Metropolitan sewers. An inspector who covers both North and South Metropolitan Sewerage Districts has been employed. His duties are to see that all newly constructed garages or other gasoline-using establishments are supplied with a proper gasoline separator and also to see that these separators are kept in working condition.

During the year 1938 the number of permits issued by the municipalities in the Sewerage Districts for the construction of garages and other places where gasoline is used was 290. Each of these permits necessitates an examination by our inspector. Many of them are attended to through the mails and do not require a personal visit. Visits are made, however, to all locations where a connection is to be made with the public sewerage system and to such places as do not respond to the return postal cards sent out. During the year 27 such places were connected with the sewers that empty into the Metropolitan Systems. At the present time there are according to our records 1787 garages and other establishments where gasoline is used connected with the local sewerage systems which discharge into the Metropolitan sewers.

This system of inspection has improved the gasoline situation in regard to the danger to the sewers. Occasionally odors of gasoline are detected in the sewers. These are reported to the Department of Public Safety which alone has statutory control of the distribution and handling of gasoline in the Commonwealth.



## PUMPING STATIONS

### Capacities and Results

#### NORTH METROPOLITAN SYSTEM

##### *Deer Island Pumping Station*

At this station are four submerged centrifugal pumps with impeller wheels 8.25 feet in diameter, driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 100,000,000 gallons, with 19-foot lift.

Contract capacity of 3 pumps: 45,000,000 gallons each, with 19-foot lift.

Average coal duty for the year: 56,000,000 foot pounds.

Average quantity raised each day: 89,600,000 gallons.

Maximum quantity raised per day: 155,500,000 gallons.

##### *East Boston Pumping Station*

At this station are four submerged centrifugal pumps, with impeller wheels 8.25 feet in diameter, driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 100,000,000 gallons, with 19-foot lift.

Contract capacity of 3 pumps: 45,000,000 gallons each, with 19-foot lift.

Average coal duty for the year: 53,400,000 foot pounds.

Average quantity raised each day: 87,600,000 gallons.

Maximum quantity raised per day: 153,500,000 gallons.

##### *Charlestown Pumping Station*

At this station are three submerged centrifugal pumps, two of them having impeller wheels 7.5 feet in diameter, the other 8.25 feet in diameter. They are driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 60,000,000 gallons, with 8-foot lift.

Contract capacity of 2 pumps: 22,000,000 gallons each, with 11-foot lift.

Average coal duty for the year: 62,000,000 foot pounds.

Average quantity raised each day: 54,400,000 gallons.

Maximum quantity raised per day: 69,500,000 gallons.

##### *Alewife Brook Pumping Station*

The pumping units in this station consist of one Andrews pump driven by a compound marine engine, one Morris pump and Morris compound engine and a specially designed engine of vertical cross-compound type having between the cylinders a centrifugal pump rotating on a horizontal axis.

Contract capacity of the Andrews pump: 4,500,000 gallons, with 13-foot lift.

Contract capacity of Morris pump: 8,000,000 gallons, with 15-foot lift.

Contract capacity of the special pump: 13,000,000 gallons, with 13-foot lift.

Average coal duty for the year: 31,600,000 foot pounds.

Average quantity raised each day: 9,270,000 gallons.

Maximum quantity raised per day: 14,800,000 gallons.

##### *Reading Pumping Station*

At this station are two submerged centrifugal pumps, one of 2,500,000 gallons per 24 hours, and one of 4,000,000 gallons per 24 hours, capacity. These operate against a maximum head of 65 feet, and are actuated by vertical shafts directly connected with 75 and 100 horse-power motors.

Alternating current of 440 volts furnished by the town of Reading is used.

Average quantity pumped per 24 hours: 1,340,000 gallons.

Maximum quantity raised per day: 4,000,000 gallons.

## SOUTH METROPOLITAN SYSTEM

*Ward Street Pumping Station*

At this station are two vertical, triple-expansion pumping engines, of the Allis-Chalmers type, operating reciprocating pumps, the plungers of which are 48 inches in diameter with a 60-inch stroke and one 50,000,000-gallon centrifugal pumping unit actuated by a 500 H.P. Uniflow engine.

Contract capacity of 3 pumps: 50,000,000 gallons each, with 45-foot lift.

Average coal duty for the year: 77,900,000 foot pounds.

Average quantity raised each day, 40,150,000 gallons.

Maximum quantity raised per day: 69,100,000 gallons.

*Quincy Pumping Station*

The plant at this station consists of one Lawrence centrifugal pump driven by a Sturtevant compound condensing engine, one Morris centrifugal pump driven by a Morris compound condensing engine, and one DeLaval centrifugal pump driven by a Fitchburg vertical uniflow engine.

Contract capacity of 3 pumps: Lawrence centrifugal, 10,000,000 gallons; Morris centrifugal, 10,000,000 gallons; DeLaval centrifugal, 15,000,000 gallons.

Average coal duty for the year: 34,000,000 foot pounds.

Average quantity raised each day: 8,880,000 gallons.

Maximum quantity raised per day: 35,440,000 gallons.

*Nut Island Screen-house*

The plant at this house includes two sets of screens in duplicate actuated by small reversing engines of the Fitchburg type. Two vertical tubular boilers, 80 horsepower each, operate the engines, provide heat and light for the house, burn materials intercepted at the screens, and furnish power for the Hough's Neck pumping station.

Average daily quantity of sewage passing screens: 107,000,000 gallons.

Maximum quantity passing screens per day: 275,000,000 gallons.

*Hough's Neck Pumping Station*

At this station are two 6-inch submerged Lawrence centrifugal pumps with vertical shafts actuated by two Sturtevant direct-current motors.

The labor and electric energy for this station are supplied from the Nut Island Screen-house, and as used at present it does not materially increase the amount of coal used at the latter station.

Average quantity raised each day: 284,000 gallons.

Maximum quantity raised per day: 910,000 gallons.

*Squantum Pumping Station*

At this station are two pumping units each consisting of a 10-inch submerged DeLaval centrifugal pump with vertical shaft actuated by a Crocker-Wheeler 60 H.P. motor. Each unit is capable of lifting 4,000,000 gallons of sewage per 24 hours against a head of 46 feet.

The electric energy for this station is purchased from the Quincy Electric Light & Power Company.

Average quantity raised each day: 224,000 gallons.

*Braintree-Weymouth Pumping Station*

At this station are two pumping units consisting of DeLaval centrifugal pumps actuated by 150 H.P. direct connected Winton diesel engines, together with all accessories appertaining thereto. Each unit is capable of lifting 15,000,000 gallons of sewage per 24 hours against a head of 30 feet.

Average quantity raised per day: 1,400,000 gallons.



*Average Daily Volume of Sewage lifted at Each of the Ten Metropolitan Sewerage Pumping Stations during the Year, as compared with the Corresponding Volumes for the Previous Year*

PUMPING STATION	AVERAGE DAILY PUMPAGE			
	Jan. 1, 1938 to Dec. 31, 1938	Jan. 1, 1937 to Dec. 31, 1937	Increase during the Year	
	Gallons	Gallons	Gallons	Per Cent.
Deer Island . . . . .	89,600,000	84,500,000	5,100,000	6.04
East Boston . . . . .	87,600,000	82,500,000	5,100,000	6.18
Charlestown . . . . .	54,400,000	45,800,000	8,600,000	18.78
Alewife Brook . . . . .	9,270,000	8,700,000	570,000	6.55
Reading . . . . .	1,340,000	1,590,000	250,000*	15.72
Quincy . . . . .	8,880,000	7,480,000	1,400,000	18.72
Ward Street (actual gallons pumped) . . .	40,150,000	35,700,000	4,450,000	12.47
Hough's Neck . . . . .	284,000	263,000	21,000	7.99
Squantum . . . . .	224,000	178,000	46,000	25.84
Braintree-Weymouth . . . . .	1,400,000	1,070,000	330,000	30.75

\*Decrease.

METROPOLITAN SEWERAGE OUTFALLS

The Metropolitan Sewerage Districts now have outfalls in Boston Harbor at five points, two of which may discharge sewage from the North District and three from the South District.

During the year the sewage of the North District has been discharged wholly through the outlet located near Deer Island light. The other outfall of this system is closed by a cast-iron cover which can easily be removed.

Of the outfalls of the South District, two extend for a distance exceeding one mile from the shore of Nut Island, Quincy, and the third one, called an emergency outlet, extends about 1,500 feet from the same. It was necessary to discharge sewage through this outfall 433 hours during the year.

During the year the average flow through the North Metropolitan District outfall at Deer Island has been 89,600,000 gallons of sewage per 24 hours, with a maximum rate of 155,500,000 gallons during a stormy period in August, 1938. The amount of sewage discharged from the North Metropolitan District averaged 129 gallons per day for each person, taking the estimated population of the District contributing sewage. If the sewers in this District were restricted to the admission of sewage proper only, this per capita amount would be considerably decreased.

In the South Metropolitan District an average of 107,000,000 gallons of sewage per 24 hours has passed through the screens at the Nut Island screen-house and has been discharged from the outfalls into the outer harbor. The maximum rate of discharge per day which occurred during a stormy period in July, 1938, was 275,000,000 gallons. The discharge of sewage through these outfalls represents the amount of sewage contributed by the South Metropolitan District, which was at the rate of 187 gallons per day per person of the estimated number contributing sewage in the District.

MATERIAL INTERCEPTED AT THE SCREENS

The material removed from the sewage at the screens of the North Metropolitan Sewerage Stations, consisting of rags, paper and other floating materials, has during the year amounted to 1,550 cubic yards. This is equivalent to 1.28 cubic feet for each million gallons of sewage pumped at Deer Island.

The material removed from the sewage at the screens of the South Metropolitan Sewerage Stations amounted to 4,679 cubic yards, equal to 3.24 cubic feet per million gallons of sewage delivered at the outfall works at Nut Island.

Studies of sewage flows in the Metropolitan sewers and siphons indicate that they are free from deposit.

## Construction

### NORTH METROPOLITAN RELIEF SEWER

Surveys, borings, plans and specifications of the North Metropolitan Relief Sewer between Cradock Dam and Chelsea Creek were substantially completed during the past year. The work was divided into five sections: namely, 106A, 105, 104, 103, 102. The deepening of Chelsea Creek at the location of the existing North Metropolitan siphon made it necessary to construct a new siphon. This latter work was combined with the North Metropolitan Relief Sewer Siphon and became designated as Section 101 of the North Metropolitan System. To overcome nuisances created by the temporary terminus of the North Metropolitan Relief Sewer near Cradock Dam, the Department of Health recommended that a force main be constructed between the North Metropolitan Relief Sewer and the existing North Metropolitan trunk line. The following is a brief description of each section together with a summary of bids where bids had been taken during the year:

### NORTH METROPOLITAN RELIEF SEWER

#### *Section 106A*

This section is located in Medford and embraces the construction of approximately 4710 feet of reinforced concrete sewer 8½' high and 8½' wide together with a 3-pipe 54" cast-iron siphon approximately 342 feet long under the Mystic River. Bids were opened on this section on September 15, 1938, and were rejected by the Commission because of unbalancing. The section was readvertised and bids were opened on October 20, 1938. The contract was awarded by the Metropolitan District Commission on October 20, 1938, and thereafter approved by the Massachusetts Emergency Public Works Commission and the Federal Emergency Administration of Public Works. Work was started by Edward M. Matz, Inc. on October 31, 1938, and on December 31, 1938, was seven per cent. completed.

#### *Section 105*

This section is located in Medford and Everett and embraces the construction of about 6500 feet of sewer varying in size from 8'6" to 10'6" and including an inverted siphon about 350 feet long in tunnel under the Malden River, two tunnels at railroad crossings, a tunnel under the Fellsway, and a tunnel under the Revere Beach Parkway. Bids were opened on this section on December 8, 1938. The contract was awarded by the Metropolitan District Commission on December 8, 1938 to V. Barletta Company, and thereafter approved by the Massachusetts Emergency Public Works Commission and the Federal Emergency Administration of Public Works. By December 31, 1938, no construction work had been done on this section.

#### *Section 104*

This work is located in Everett and embraces the construction of approximately 4072 feet of sewer including about 1075 lin. ft. of 11'3"x11'3" of reinforced concrete sewer in open cut, 1481 lin. ft. of 11'3" sewer in tunnel and 1478 lin. ft. of 10'6" diameter sewer in tunnel with shafts and other appurtenances. Bids were opened on this section on December 22, 1938. The contract was awarded by the Metropolitan District Commission on December 30, 1938, to V. J. Grande Company subject to its ability to furnish a satisfactory bond and otherwise complete the contract documents.

#### *Section 103*

This section is located in Everett and Chelsea and embraces the construction of about 3643 lin. ft. of 11'3" concrete sewer in tunnel together with shafts and other appurtenances.



THE COMMONWEALTH OF MASSACHUSETTS  
METROPOLITAN DISTRICT COMMISSION

SEWERAGE DIVISION

CANVASS OF BIDS — NORTH METROPOLITAN RELIEF SEWER — SECTION 106A — OCTOBER 20, 1938

BIDDERS AND ADDRESSES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		26	TOTALS
	EARTH EXCAVATION IN TRENCH ABOVE SEWER GRADE 40,000 Cu. Yds.	EARTH EXCAVATION IN TRENCH BELOW SEWER GRADE 8,000 Cu. Yds.	EARTH EXCAVATION FOR CAST IRON PIPE SYPHON 6,000 Cu. Yds.	EARTH EXCAVATION UNCLASSIFIED 1,000 Cu. Yds.	GRAVEL REFILL 8,000 Cu. Yds.	Rock EXCAVATION 200 Cu. Yds.	CONCRETE 8,500 Cu. Yds.	METAL REINFORCEMENT 300 Tons	PIPE UNDERDRAIN 6,000 LIN. FT.	BRICK MASONRY 30 Cu. Yds.	REVETMENT PAVING 2,000 Sq. Yds.	LUMBER AND SHEETING USED AND LEFT IN PLACE 750 M.F.B.M.	LUMBER AND SHEETING USED AND REMOVED 550 M.F.B.M.	STRUCTURAL TIMBER FOR PILE PLATFORM 200 M.F.B.M.	STEEL SHEETING USED AND LEFT IN PLACE 500 Sq. Ft.	STEEL SHEETING USED AND REMOVED 24,500 Sq. Ft.	MINOR DRAINS 200 LIN. FT.	WOOD PILES 50,000 LIN. FT.	PILE LOAD TESTS 10 OF THEM	CAST IRON PIPES AND FITTINGS 600 Tons	MANHOLE FRAMES AND COVERS 3,600 POUNDS	MISCELLANEOUS IRON 9,000 POUNDS	STREET PAVEMENT RESURFACED 2,000 Sq. Yds.	GROUT 2,000 BAGS	PREPARATION AT SITE CLEANING UP, ETC. LUMP SUM	TOTALS ITEMS 1 to 25 INCLUSIVE	BOND—ADD 1 1/2% OF THE PREVIOUS TOTAL	ESTIMATED TOTAL CONTRACT PRICE
Edward M. Matz, Inc., 25 Zamorra St., Jamaica Plain	1.40	.50	2.00	.50	.50	.50	10.50	80.00	1.00	40.00	.50	35.00	10.00	10.00	1.40	.60	2.00	.25	10.00	75.00	.06	.06	.50	.75				
	56,000.00	4,000.00	12,000.00	500.00	4,000.00	100.00	89,250.00	24,000.00	6,000.00	1,200.00	1,000.00	26,250.00	5,500.00	2,000.00	700.00	14,700.00	400.00	12,500.00	100.00	45,000.00	216.00	540.00	1,000.00	1,500.00	5,000.00	313,456.00	4,701.84	318,157.84
P. DeCristoforo 33 Glendower St., Roslindale	1.00	1.00	2.50	1.00	1.50	2.00	12.00	65.00	1.00	30.00	.25	30.00	10.00	10.00	1.00	1.50	1.00	.10	10.00	70.00	.08	.08	.25	.40				
	40,000.00	8,000.00	15,000.00	1,000.00	12,600.00	400.00	102,000.00	19,500.00	6,000.00	900.00	500.00	22,500.00	5,500.00	2,000.00	500.00	36,750.00	200.00	5,000.00	100.00	42,000.00	288.00	720.00	500.00	800.00	5,000.00	327,158.00	4,907.37	332,065.37
A. Baruffaldi 52 Powderhouse Blvd., Somerville	1.30	.50	1.50	.50	.50	1.30	15.00	60.00	.50	35.00	1.50	30.00	5.00	30.00	.70	.90	1.00	.25	50.00	65.00	.03	.03	.60	.60				
	52,000.00	4,000.00	9,000.00	500.00	4,000.00	260.00	127,500.00	18,000.00	3,000.00	1,050.00	3,000.00	22,500.00	2,750.00	6,000.00	350.00	22,050.00	200.00	12,500.00	500.00	39,000.00	108.00	270.00	1,200.00	1,200.00	500.00	331,438.00	4,971.57	336,409.57
V. Barlotta Co., 10 Whipple Ave., Roslindale	1.70	1.00	3.00	3.00	1.00	1.00	10.00	63.00	.60	28.00	1.30	25.00	10.00	55.00	2.25	.65	1.00	.33	100.00	72.00	.06	.10	.80	.70				
	68,000.00	8,000.00	18,000.00	3,000.00	8,000.00	200.00	85,000.00	18,900.00	3,600.00	840.00	2,600.00	18,750.00	5,500.00	11,000.00	1,125.00	15,925.00	200.00	16,500.00	1,000.00	43,200.00	216.00	900.00	1,600.00	1,400.00	5,000.00	338,456.00	5,076.84	343,532.84
Coleman Bros. Corp., 245 State St., Boston	1.40	1.40	1.40	1.00	.80	1.50	10.50	65.00	.50	30.00	1.00	30.00	15.00	50.00	1.50	.80	1.00	.50	150.00	70.00	.08	.08	.75	.75				
	56,000.00	11,200.00	8,400.00	1,000.00	6,400.00	300.00	89,250.00	19,500.00	3,000.00	900.00	2,000.00	22,500.00	8,250.00	10,000.00	750.00	19,600.00	200.00	25,000.00	1,500.00	42,000.00	288.00	720.00	1,500.00	1,500.00	8,000.00	339,758.00	5,096.37	344,854.37
C. & R. Const. Co., 75 Bradeen St., Roslindale	1.00	1.00	2.50	2.00	.50	1.00	14.00	85.00	.25	30.00	.50	25.00	2.00	25.00	1.10	1.50	.50	.20	50.00	83.00	.05	.03	.50	.55				
	40,000.00	8,000.00	15,000.00	2,000.00	4,000.00	200.00	119,000.00	25,500.00	1,500.00	900.00	1,000.00	18,750.00	1,100.00	5,000.00	550.00	36,750.00	100.00	10,000.00	500.00	49,800.00	180.00	270.00	1,000.00	1,100.00	500.00	342,700.00	5,140.50	347,840.50

CONTRACT AWARDED TO EDWARD M. MATZ, INC.

I certify this to be a true and accurate summary of bids

JOSEPH P. DEVER,  
Chief Engineer of Sewerage Division

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Contract No.		Description of Work		Amount
1	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
2	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
3	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
4	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
5	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
6	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
7	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
8	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
9	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00
10	100-10000	Construction of 3-pipe siphon	54" diameter	\$100,000.00

CONTRACT NO. 100-10000  
DESCRIPTION OF WORK  
AMOUNT



THE COMMONWEALTH OF MASSACHUSETTS  
METROPOLITAN DISTRICT COMMISSION

SEWERAGE DIVISION

CANVASS OF BIDS — FORCE MAIN UNDER MYSTIC RIVER IN MEDFORD, MASS. — OCTOBER 20, 1938

BIDDERS AND ADDRESSES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
	EARTH EXCAVATION IN GRADE 3,000 Cu. Yds.	EARTH EXCAVATION IN TRENCH BELOW GRADE 400 Cu. Yds.	EARTH EXCAVATION FOR RIVER CROSSING 800 Cu. Yds.	EARTH EXCAVATION UNCLASSIFIED 900 Cu. Yds.	GRAVEL REFILL 1,300 Cu. Yds.	ROCK OR MASONRY EXCAVATION 5 Cu. Yds.	CONCRETE 150 Cu. Yds.	METAL REINFORCEMENT 2 Tons	PIPE UNDERDRAIN 2,000 LINEAR FT.	BRICK MASONRY 5 Cu. Yds.	LUMBER AND SHEETING USED AND LEFT IN PLACE 100 M.F.B.M.	LUMBER AND SHEETING USED AND REMOVED 60 M.F.B.M.	STEEL SHEETING USED AND REMOVED 13,500 Sq. Ft.	MINOR DRAINS 30 LIN. FT.	CAST IRON PIPES AND FITTINGS 230 Tons	24" REINFORCED CONCRETE PRESSURE PIPE 2,000 LIN. FT.	24" ASBESTOS CEMENT PRESSURE PIPE 2,000 LIN. FT.	MISCELLANEOUS IRON 200 POUNDS	STREET PAVEMENT RESURFACED 80 Sq. Yds.	ELECTRIC CABLE PLACED 2,100 LINEAR FT.	DUCT FOR PROTECTION OF ELECTRIC CABLE 100 LIN. FT.	MANHOLE FRAMES AND COVERS 500 POUNDS	PREPARATION AT SITE, CLEANING UP, ETC., LUMP SUM	TOTAL—Using CAST IRON PIPE All Items EXCEPT 16 AND 17	TOTAL—Using REINFORCED CONCRETE PRESSURE PIPE All Items EXCEPT 15 AND 17	TOTAL—Using ASBESTOS CEMENT PRESSURE PIPE All Items EXCEPT 15 AND 16
Domenick Zanni 22 Lakeview Ave., Reading, Mass.	1.25	2.00	2.50	1.00	.90	10.00	8.50	100.00	.70	25.00	80.00	60.00	.50	1.50	75.00	5.00	5.60	.35	2.00	.20	.50	.05				
	3,750.00	800.00	2,000.00	900.00	1,170.00	50.00	1,275.00	200.00	1,400.00	125.00	8,000.00	3,600.00	6,750.00	45.00	17,250.00	10,000.00	11,200.00	70.00	160.00	420.00	50.00	25.00	2,500.00	50,540.00	43,290.00	44,490.00
Angelo Grande 60 Braeden St., Roslindale, Mass.	1.00	4.00	5.50	1.00	1.50	8.00	10.50	100.00	.30	40.00	22.00	11.00	.75	3.00	60.00	5.00	5.80	.25	3.00	2.00	.35	.20				
	3,000.00	1,600.00	4,400.00	900.00	1,950.00	40.00	1,575.00	200.00	600.00	200.00	2,200.00	660.00	10,125.00	90.00	13,800.00	10,000.00	11,600.00	50.00	240.00	4,200.00	35.00	100.00	2,000.00	47,965.00	44,165.00	45,765.00
V. Barletta Co., 10 Whipple Ave., Roslindale, Mass.	3.25	1.50	5.00	2.00	1.20	10.00	10.00	75.00	.60	30.00	30.00	12.00	.80	2.00	70.00	4.50	6.50	.10	5.00	.40	2.00	.07				
	9,750.00	600.00	4,000.00	1,800.00	1,560.00	50.00	1,500.00	150.00	1,200.00	150.00	3,000.00	720.00	10,800.00	60.00	16,100.00	9,000.00	13,000.00	20.00	400.00	840.00	200.00	35.00	1,200.00	54,135.00	47,035.00	51,035.00
N. Cibotti Co., 15 Page St., Hyde Park, Mass.	1.50	2.50	3.00	1.00	2.00	2.00	10.00	100.00	.50	30.00	35.00	15.00	1.30	1.00	60.00	4.00	7.00	.10	2.00	1.00	2.00	.10				
	4,500.00	1,000.00	2,400.00	900.00	2,600.00	10.00	1,500.00	200.00	1,000.00	150.00	3,500.00	900.00	17,550.00	30.00	13,800.00	8,000.00	14,000.00	20.00	160.00	2,100.00	200.00	50.00	500.00	53,070.00	47,270.00	53,270.00
Coleman Bros. Corp., 245 State St., Boston, Mass.	2.00	2.00	5.00	1.00	1.00	7.00	13.00	90.00	1.00	30.00	30.00	20.00	1.00	1.00	80.00	5.00	6.00	.10	2.00	.50	1.00	.10				
	0,000.00	800.00	4,000.00	900.00	1,300.00	35.00	1,950.00	180.00	2,000.00	150.00	3,000.00	1,200.00	13,500.00	30.00	18,400.00	10,000.00	12,000.00	20.00	160.00	1,050.00	100.00	50.00	2,500.00	57,325.00	48,925.00	50,925.00
M. & R. Const. Co., 88 Broad St., Boston, Mass.	.60	1.00	3.00	1.00	1.25	30.00	30.00	150.00	.30	50.00	75.00	70.00	1.00	15.00	75.00	5.40	6.75	.50	5.00	.20	.50	.45				
	1,800.00	400.00	2,400.00	900.00	1,725.00	150.00	4,500.00	300.00	600.00	250.00	7,500.00	4,200.00	13,500.00	450.00	17,250.00	10,800.00	13,500.00	100.00	400.00	420.00	50.00	225.00	2,000.00	59,120.00	52,670.00	55,370.00
A. Baruffaldi Co., 62 Powderhouse Blvd., Somerville, Mass.	2.00	1.00	5.00	.50	.70	10.00	15.00	60.00	1.00	40.00	25.00	10.00	1.20	2.00	80.00	7.00	7.00	.10	1.00	1.00	1.00	.10				
	6,000.00	400.00	4,000.00	450.00	910.00	50.00	2,250.00	120.00	2,000.00	200.00	2,500.00	600.00	16,200.00	60.00	18,400.00	14,000.00	14,000.00	20.00	80.00	2,100.00	100.00	50.00	1,000.00	57,490.00	53,090.00	53,090.00
C. & R. Const. Co., 75 Braeden St., Roslindale, Mass.	1.00	1.00	4.00	2.00	1.00	1.00	10.00	80.00	.25	30.00	10.00	5.00	1.00	.50	No Bid	8.70	No Bid	.06	.80	.15	.80	.06				
	3,000.00	400.00	3,200.00	1,800.00	1,300.00	5.00	1,500.00	160.00	500.00	150.00	1,000.00	300.00	13,500.00	15.00	—	17,400.00	—	12.00	64.00	315.00	80.00	30.00	10,000.00	No Bid	54,731.00	No Bid

CONTRACT AWARDED TO DOMENIC ZANNI

I certify this to be a true and accurate summary of bids

JOSEPH P. DEVER,  
Chief Engineer of Sewerage Division

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THE COMMONWEALTH OF MASSACHUSETTS  
METROPOLITAN DISTRICT COMMISSION  
SEWERAGE DIVISION

CANVASS OF BIDS — NORTH METROPOLITAN RELIEF SEWER — SECTION 105 — DECEMBER 8, 1938

BIDDERS AND ADDRESSES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	TOTALS 1-29 Inc.	30	ESTIMATED TOTAL CON. PRICE
	EARTH EXCAVATION IN TRENCH ABOVE GRADE 70,000 Cu. Yds.	EARTH EXCAVATION IN TRENCH BELOW GRADE 2,000 Cu. Yds.	EARTH EXCAVATION UNCLASSIFIED 100 Cu. Yds.	GRAVEL REFILL 4,000 Cu. Yds.	ROCK EXCAVATION 100 Cu. Yds.	CONCRETE OR BRICK MASONRY REMOVED 400 Cu. Yds.	CONCRETE, EXCEPT IN TUNNELS 12,300 Cu. Yds.	METAL REINFORCEMENT EXCEPT IN TUNNELS 400 TONS	PIPE UNDERDRAIN 6,000 LIN. FT.	LUMBER AND SHEETING USED AND LEFT IN PLACE 750 M.F.B.M.	LUMBER AND SHEETING USED AND REMOVED 1,400 M.F.B.M.	STEEL SHEETING USED AND LEFT IN PLACE 3,000 SQ. FT.	MINOR DRAINS, OTHER THAN CAST IRON DRAINS 100 LIN. FT.	CAST IRON PIPE AND FITTINGS 2 TONS	BRICK MASONRY 100 Cu. Yds.	MANHOLE FRAMES AND COVERS 5,000 LBS.	MISCELLANEOUS IRON 2,500 LBS.	30" V.C. PIPE DRAIN 200 LIN. FT.	42" REINFORCED CONCRETE CULVERT PIPE 550 LIN. FT.	REVETMENT PAVING 300 SQ. YDS.	STREET PAVEMENTS RESURFACED 600 SQ. YDS.	8'-6" INSIDE DIAMETER RELIEF SEWER IN TUNNEL 1150 LIN. FT.	9'-3" INSIDE DIAMETER RELIEF SEWER IN TUNNEL (FREE AIR) 390 LIN. FT.	10'-6" INSIDE DIAMETER RELIEF SEWER IN TUNNEL (FREE AIR) 110 LIN. FT.	ADDITIONAL COST TUNNEL UNDER COMPRESSED AIR ABOVE COST OF FREE AIR OPERATION 636 LIN. FT.	2 SHAFTS AND 2 HEADHOUSES FOR MALDEN RIVER SIPHON LUMP SUM	TWO-PIPE 60" SIPHON UNDER MALDEN RIVER IN- CLUDING COST OF COMPRESSED AIR WORK 341 LIN. FT.	GROUT 14,500 BAGS CEMENT	PREPARATION AT SITE CLEANING UP, ETC. LUMP SUM	TOTALS ITEMS 1 TO 29 INCLUSIVE	ROSD—ADD 1 1/2% OF THE PREVIOUS TOTAL	ESTIMATED TOTAL CONTRACT PRICE
Barletta Co., 2 Whipple Ave., Malden, Mass.	2.00 140,000.00	1.50 3,000.00	3.00 300.00	1.00 4,000.00	3.00 300.00	3.00 1,200.00	10.00 125,000.00	70.00 28,000.00	.75 4,500.00	30.00 22,500.00	10.00 14,000.00	1.50 7,500.00	1.00 100.00	80.00 160.00	30.00 3,000.00	.06 300.00	.05 125.00	3.00 600.00	6.00 3,300.00	4.00 1,200.00	2.00 1,200.00	150.00 20,400.00	200.00 78,000.00	275.00 30,250.00	10.00 0,360.00	45,000.00 45,000.00	365.00 124,465.00	1.00 14,500.00	5,000.00	684,260.00	10,263.90	694,523.90
F. & R. Const. Co., 3 Bradeen St., Malden, Mass.	2.50 175,000.00	1.00 2,000.00	3.00 300.00	.40 1,600.00	1.00 100.00	4.00 1,600.00	12.50 156,250.00	69.00 27,600.00	.25 1,500.00	32.00 24,000.00	2.00 2,800.00	.60 3,000.00	1.00 100.00	70.00 140.00	28.00 2,800.00	.05 250.00	.05 125.00	4.25 850.00	7.00 3,850.00	2.00 600.00	1.00 600.00	200.00 27,200.00	210.00 81,900.00	300.00 33,000.00	1.00 636.00	95,000.00 95,000.00	500.00 170,500.00	.65 9,425.00	500.00	823,226.00	12,348.39	835,574.39
F. Fitzgerald Const. Co., 4 Essex St., Boston, Mass.	2.64 184,800.00	2.50 5,000.00	3.00 300.00	.90 3,600.00	5.00 500.00	6.00 2,400.00	12.00 150,000.00	85.00 34,000.00	2.00 12,000.00	36.00 27,000.00	20.00 28,000.00	1.25 6,250.00	1.00 100.00	100.00 200.00	35.00 3,500.00	.08 400.00	.10 250.00	5.00 1,000.00	9.00 4,950.00	1.00 300.00	1.10 660.00	300.00 40,800.00	326.00 127,140.00	374.00 41,140.00	50.00 31,800.00	72,000.00 72,000.00	483.00 164,703.00	1.00 14,500.00	8,000.00	965,293.00	14,479.40	979,772.40

CONTRACT AWARDED TO V. BARLETTA CO.

I certify this to be a true and accurate summary of bids

JOSEPH P. DEVER,  
Chief Engineer of Sewerage Division





*Section 102*

This section is located in Chelsea and embraces the construction of about 4310 lin. ft. of 11'3" sewer of which 640 lin. ft. will be open cut and the remainder in tunnel together with shafts and other appurtenances.

## NORTH METROPOLITAN SYSTEM

*Section 101*

The work contemplated in this section is located in Boston and Chelsea and entails crossing under Chelsea Creek. It embraces the construction of about 685 lin. ft. of tunnel, 20 feet outside diameter in which three reinforced concrete pipes will be laid and encased in concrete; 295 lin. ft. of tunnel, 14 feet outside diameter with a concrete lining of 11'3" inside diameter; 225 lin. ft. of tunnel, 10 feet outside diameter encasing a 6' reinforced concrete pipe; two shafts 90 feet deep, two shafts 70 feet deep, one shaft 45 feet deep, about 55 feet of 6' reinforced concrete sewer in open cut, about 200 feet of 11'3" reinforced concrete sewer in open cut, together with headhouses, bulkheads and other appurtenant work. Bids were opened on this section on December 22, 1938, and were taken under advisement by the Metropolitan District Commission because it appeared that insufficient funds were available for the work contemplated. On December 29, 1938, the Metropolitan District Commission awarded a contract to Edward M. Matz, Inc. in the sum of \$930 for preliminary excavation in connection with this section, which preliminary excavation work was begun on December 30, 1938.

## FORCE MAIN UNDER MYSTIC RIVER

The work contemplated in this construction is located in Medford and comprises the construction of approximately 1990 lin. ft. of 24" reinforced concrete pipe force main from a point near Mystic Avenue, thence under the Mystic River to an existing sewer in Riverside Avenue. Bids were opened on this work on October 20, 1938. The contract was awarded by the Metropolitan District Commission on October 28, 1938. Work was started by Domenick Zanni on November 2, 1938, and on December 31, 1938 was sixty-five per cent completed.

**IX. Other Reports**

Tables, statistics and financial statements relating to the several divisions are hereto appended.

Respectfully submitted,

E. C. HULTMAN,  
*Metropolitan District Commissioner.*

February 28, 1939.

## APPENDIX No. 1

## FINANCIAL STATEMENT

of the

## METROPOLITAN DISTRICT COMMISSION

FOR THE YEAR ENDING NOVEMBER 30, 1938

	CONDITION OF FUND AS OF DEC. 1, 1937	AMOUNT AVAILABLE 1938	EXPENDED 1938	BALANCE DEC. 1, 1938
Metropolitan Parks District				
Hurricane and Flood Damage:				
Chapter 507, Acts of 1938 . . . . .		\$650,000.00	\$66,633.18	\$583,366.82
Metropolitan Water District				
Hurricane and Flood Damage:				
Chapter 507, Acts of 1938 . . . . .		\$100,000.00	\$1,848.23	\$98,151.77

## Construction

## PARKS DIVISION

Charles River Basin Improvement Fund:				
Chapter 371, Acts of 1929 . . . . .	\$2,305,000.00			
Less Chapter 179, Acts of 1931 . . . . .	25,000.00			
Interest . . . . .	129,110.90			
	<u>\$2,409,110.90</u>			
Expended to Nov. 30, 1937 . . . . .	2,127,999.65			
		\$281,111.25	\$504.69	\$280,606.56
Less amount transferred to Recreation Building:				
Chapter 356, Acts of 1938 . . . . .				100,000.00
				<u>\$180,606.56</u>
Charles River Basin Improvement Fund:				
Recreation Building:				
Chapter 356, Acts of 1938 . . . . .	\$100,000.00	\$12,119.14		\$87,880.86
Metropolitan Parks Construction Fund:				
Specials:				
*Bath House, Watertown:				
Chapter 331, Acts of 1936				
Chapter 432, Acts of 1936				
Construction and Incidentals . . . . .	\$41,870.00			
Expended to Nov. 30, 1937 . . . . .	65.85			
		\$41,804.15	\$30,956.40	\$10,847.75
Beach	\$23,130.00			
Expended to Nov. 30, 1937 . . . . .	23,127.53			
		2.47	-	2.47
Total, Bath House, Watertown:				
Chapter 331, Acts of 1936 . . . . .	\$32,500.00			
Chapter 432, Acts of 1936 . . . . .	32,500.00			
	<u>\$65,000.00</u>			
Expended to Nov. 30, 1937 . . . . .	23,193.38			
		\$41,806.62	\$30,956.40	\$10,850.22
Additional Facilities, Ponkapoag Golf Course:				
Chapter 234, Acts of 1937 . . . . .	\$20,000.00			
Expended to Nov. 30, 1937 . . . . .	2,900.24			
		\$17,099.76	\$11,137.54	\$5,962.22
Oak Island, Sanitary:				
Chapter 234, Acts of 1937 . . . . .	\$12,000.00			
Expended to Nov. 30, 1937 . . . . .	18.00			
		\$11,982.00	\$11,975.60	\$6.40
Radio Room:				
Chapter 234, Acts of 1937 . . . . .	\$5,000.00			
Expended to Nov. 30, 1937 . . . . .	-			
		\$5,000.00	-	\$5,000.00
Public Sanitary, Winthrop Shore Reservation:				
Chapter 497, Acts of 1938				
Construction and Incidentals . . . . .	\$15,550.00			\$15,550.00
Taking of Land . . . . .	4,450.00		4,356.25	93.75
Total, Public Sanitary, Winthrop Shore Reservation:				
Chapter 497, Acts of 1938 . . . . .	\$20,000.00	\$4,356.25		\$15,643.75

\*Allotment revised Nov. 10, 1938.



*Construction (Continued)*

	CONDITION OF FUND AS OF DEC. 1, 1937	AMOUNT AVAILABLE 1938	EXPENDED 1938	BALANCE DEC. 1, 1938
Parks Division ( <i>Continued</i> )				
Metropolitan Parks Construction Fund,				
Boulevards:				
Specials:				
Improvement of Land, Old Colony Parkway:				
Chapter 497, Acts of 1935				
Incidentals . . . . .	\$30,000.00			
Less amount transferred to				
Bath House . . . . .	504.00			
	<u>\$29,496.00</u>			
Expended to Nov. 30, 1937 . . . .	29,495.16			
		\$ .84	(cr) \$281.07	\$281.91
Bath House . . . . .	\$70,000.00			
Transferred from Incidentals . . .	504.00			
	<u>\$70,504.00</u>			
Expended to Nov. 30, 1937 . . . .	65,181.87			
		5,322.13	5,320.95	1.18
Total, Improvement of Land, Old Colony Parkway:				
Chapter 497, Acts of 1935 . . . .	\$100,000.00			
Expended to Nov. 30, 1937 . . . .	94,677.03			
	<u></u>	\$5,322.97	\$5,039.88	\$283.09
Reconstruction Mystic River Bridge:				
Chapter 432, Acts of 1936 . . . .	\$46,875.00			
Chapter 377, Acts of 1936 . . . .	18,750.00			
Chapter 377, Acts of 1936 . . . .	9,375.00			
	<u>\$75,000.00</u>			
Expended to Nov. 30, 1937 . . . .	74,971.87			
		\$28.13	\$3.52	\$24.61*
Reconstruction Mystic River Bridge,				
Harvard Avenue, Medford:				
Chapter 445, Acts of 1937 . . . .	\$52,500.00			
Expended to Nov. 30, 1937 . . . .	36,494.39			
	<u></u>	\$16,005.61		
Received from City of Medford:				
Chapter 432, Acts of 1937 . . . .		11,250.00		
Received from Town of Arlington:				
Chapter 432, Acts of 1937 . . . .		11,250.00		
		<u>\$38,505.61</u>	\$38,496.63	\$8.98
Reconstruction Oak Island Bridge and Road, Revere:				
Chapter 497, Acts of 1938 . . . .		**\$67,400.00	—	\$67,400.00
Traffic Circle at West Roxbury Parkway and Centre Street:				
Chapter 497, Acts of 1938 . . . .		\$60,000.00		
Transferred to Mass. State Project D-207 P.W.A.				
Docket No. 1510F . . . . .		59,950.00		
		<u>\$50.00</u>	—	\$50.00
Underpass at Columbia Circle:				
Chapter 497, Acts of 1938 . . . .		\$65,000.00		
Transferred to Mass. State Project D-206, P.W.A.				
Docket No. 1512F . . . . .		64,900.00		
		<u>\$100.00</u>	—	\$100.00
Traffic Circle at West Roxbury Parkway and Centre Street:				
Mass. State Project D-207, P.W.A. Docket No. 1510F				
Chapter 497, Acts of 1938 . . . .		\$59,950.00	\$174.65	\$59,775.35
Underpass at Columbia Circle:				
Mass. State Project D-206, P.W.A. Docket No. 1512F				
Chapter 497, Acts of 1938 . . . .		\$64,900.00	\$104.95	\$64,795.05
Overpass and Traffic Circle, Cottage Farm Bridge:				
Mass. State Project D-210, P.W.A. Docket No. 1555F				
Chapter 494, Acts of 1938 . . . .		\$250,000.00	\$360.51	\$249,639.49

\*Reverted.

\*\*\$50,000.00 transferred from Department of Public Works.

## Construction (Continued)

	CONDITION OF FUND AS OF DEC. 1, 1937	AMOUNT AVAILABLE 1938	EXPENDED 1938	BALANCE DEC. 1, 1938
SEWERAGE DIVISION				
Metropolitan Sewerage Construction Fund,				
North System:				
Specials:				
New Mystic Valley Main Sewer:				
Chapter 184, Acts of 1927 . . . . .	\$450,000.00			
Chapter 381, Acts of 1931 . . . . .	20,482.25			
	<u>\$470,482.25</u>			
Expended to Nov. 30, 1937 . . . . .	461,287.86			
		\$9,194.39	-	\$9,194.39
Mass. State Project D-101, P.W.A.				
Docket No. Mass. 1098R:				
Authorization . . . . .	\$2,976,126.69			
Receipts . . . . .	694.00			
	<u>\$2,976,820.69</u>			
Expended to Nov. 30, 1937 . . . . .	2,598,615.33	\$378,205.36	\$277,100.09	\$101,105.27
Plans for Sewer System:				
Chapter 433, Acts of 1937 . . . . .	\$270,000.00			
Expended to Nov. 30, 1937 . . . . .	9,614.82			
		\$260,385.18	\$157,799.92	\$102,585.26
Additional Sewers:				
Mass. State Project D-201, P.W.A.				
Docket No. 1419F:				
Chapter 459, Acts of 1938 . . . . .	\$2,500,000.00		\$11,172.55	\$2,488,827.45
Syphon, Chelsea Creek:				
Chapter 491, Acts of 1938 . . . . .	\$250,000.00			
Transferred to Mass. State Project D-204, P.W.A.				
Docket No. 1574F . . . . .	250,000.00			
			-	-
Siphon-Chelsea Creek:				
Mass. State Project D-204, P.W.A. Docket No. 1574F				
Chapter 491, Acts of 1938 . . . . .	\$250,000.00		\$76.95	\$249,923.05
Metropolitan Sewerage Construction Fund,				
South System:				
Specials:				
New Neponset Valley Sewer:				
Chapter 384, Acts of 1928 . . . . .	\$2,365,000.00			
Chapter 384, Acts of 1934 . . . . .	10,000.00			
	<u>\$2,375,000.00</u>			
Expended to Nov. 30, 1937 . . . . .	2,374,323.83	\$676.17	-	\$676.17
Gravity Drainage, City of Quincy:				
Chapter 240, Acts of 1928 . . . . .	\$150,000.00			
Expended to Nov. 30, 1937 . . . . .	143,980.48			
		\$6,019.52	-	\$6,019.52
Less amount transferred to Hyde				
Park Branch Sewer . . . . .				
				5,000.00
				<u>\$1,019.52*</u>
Sewers in Quincy, Weymouth and Braintree:				
Chapter 398, Acts of 1930 . . . . .	\$600,000.00			
Expended to Nov. 30, 1937 . . . . .	571,613.49			
		\$28,386.51	\$364.00	\$28,022.51
Boston-Newton Main Sewer:				
Chapter 205, Acts of 1932 . . . . .	\$100,000.00			
Expended to Nov. 30, 1937 . . . . .	95,804.65			
		\$4,195.35	\$800.00	\$3,395.35

## WATER DIVISION

Metropolitan Water Construction Fund:				
General . . . . .	\$43,070,000.00			
Receipts . . . . .	334,327.96			
	<u>\$43,404,327.96</u>			
Expended to Nov. 30, 1937 . . . . .	43,365,676.10			
		\$38,651.86		
Receipts, year ending Nov. 30, 1938 . . . . .		456.06		
		<u>\$39,107.92</u>	\$1,151.07	\$37,956.85

\*Reverted.

Construction (Continued)

	CONDITION OF FUND AS OF DEC. 1, 1937	AMOUNT AVAILABLE 1938	EXPENDED 1938	BALANCE DEC. 1, 1938
Water Division (Continued):				
Metropolitan Water Construction Fund:				
(Continued)				
Specials:				
Property for Protection of Water Supply:				
Chapter 304, Acts of 1936 . . . .	\$10,000.00			
Chapter 234, Acts of 1937 . . . .	15,000.00			
	<hr/>			
	\$25,000.00			
Expended to Nov. 30, 1937 . . . .	8,340.06			
	<hr/>	\$16,659.94	\$1,063.24	\$15,596.70
Improvements, Supply Mains, etc:				
Chapter 245, Acts of 1931 . . . .	\$400,000.00			
Chapter 170, Acts of 1932 . . . .	350,000.00			
Chapter 174, Acts of 1933 . . . .	250,000.00			
Chapter 162, Acts of 1934 . . . .	300,000.00			
Chapter 249, Acts of 1935 . . . .	300,000.00			
Chapter 304, Acts of 1936 . . . .	300,000.00			
Chapter 234, Acts of 1937 . . . .	300,000.00			
	<hr/>			
	\$2,200,000.00			
Expended to Nov. 30, 1937 . . . .	1,870,683.49			
	<hr/>	\$329,316.51		
Chapter 356, Acts of 1938 . . . .		250,000.00		
		<hr/>		
		\$579,316.51	\$380,755.33	\$198,561.18
Less amount transferred to Mass. P.W.A. D-203, Docket No. 1516F .				184,800.00
				<hr/>
				\$13,761.18
Improvements, Supply Mains				
Mass. P.W.A. D-203, Docket No. 1516F		\$184,800.00	\$1,864.70	\$182,935.30
Improvements, Belmont, Watertown and Arlington:				
Chapter 384, Acts of 1934 . . . .	\$50,000.00			
Chapter 249, Acts of 1935 . . . .	150,000.00			
Chapter 432, Acts of 1936 . . . .	85,000.00			
	<hr/>			
	\$285,000.00			
Expended to Nov. 30, 1937 . . . .	281,701.01			
	<hr/>	\$3,298.99		
Chapter 497, Acts of 1938 . . . .		714.22		
		<hr/>		
		\$4,013.21	\$4,013.21	-
Bathing Facilities:				
Chapter 384, Acts of 1934 . . . .	\$12,000.00			
Chapter 234, Acts of 1937 . . . .	402.61			
Chapter 434, Acts of 1937 . . . .	2,500.00			
	<hr/>			
	\$14,902.61			
Expended to Nov. 30, 1937 . . . .	14,616.35			
	<hr/>	\$286.26	-	\$286.26
Fish Way, Quinapoxet Dam:				
Chapter 304, Acts of 1936 . . . .	\$4,000.00			
Expended to Nov. 30, 1937 . . . .	3,718.85			
	<hr/>	\$281.15	-	\$281.15*

Miscellaneous

PARKS DIVISION

Metropolitan Parks Trust Fund:				
Total receipts to Dec. 1, 1937 . . . .	\$42,385.86			
Total expenditures to Nov. 30, 1937 . . . .	40,261.02			
	<hr/>	\$2,124.84		
Receipts year ending Nov. 30, 1938 . . . .		-		
		<hr/>		
		\$2,124.84	\$1,560.80	\$564.04
Edwin U. Curtis Memorial Trust Fund:				
Total receipts to Dec. 1, 1937 . . . .	\$2,041.37			
Total expenditures to Nov. 30, 1937 . . . .	237.59			
	<hr/>	\$1,803.78		
Receipts year ending Nov. 30, 1938 . . . .		63.00		
		<hr/>		
		\$1,866.78	-	\$1,866.78

\*Reverted.



*Miscellaneous (Continued)*

	CONDITION OF FUND AS OF DEC. 1, 1937	AMOUNT AVAILABLE 1938	EXPENDED 1938	BALANCE DEC. 1, 1938
George R. Nutter Trust Fund:				
Receipts year ending Nov. 30, 1938 . . .		\$1,000.00	-	\$1,000.00
Blue Hills Golf Course, Income:				
Total receipts to Dec. 1, 1937 . . .	\$125,626.48			
Total expenditures to Nov. 30, 1937 . . .	320.00			
	<hr/>	\$125,306.48		
Receipts year ending Nov. 30, 1938 . . .		19,511.35		
		<hr/>		
		\$144,817.83	-	\$144,817.83
Reconstruction				
Wellington Bridge:				
Massachusetts State Project D-1, P.W.A. Docket No. 4478:				
Authorization . . . . .	\$930,251.44			
Expended to Nov. 30, 1937 . . . . .	918,216.49			
	<hr/>	\$12,034.95	\$7,346.65	\$4,688.30

**Maintenance****PARKS DIVISION****Metropolitan Parks Maintenance Fund:****General:**

Chapter 356, Acts of 1938 . . . . .	\$1,186,515.00
Chapter 356, Acts of 1938 . . . . .	200.00
Chapter 497, Acts of 1938 . . . . .	14,078.00
Transferred from "Small Items" . . . . .	96.98
Balance brought forward from 1937 appropriation to cover 1937 expenditures on 1938 books . . . . .	33,785.66

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	\$1,234,675.64	\$1,154,151.05	\$80,524.59
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**Specials:****Band Concerts:**

Chapter 356, Acts of 1938 . . . . .	\$20,000.00	\$19,983.00	\$17.00*
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**Expenses for Procuring W.P.A. Funds:**

Chapter 304, Acts of 1936 . . . . .	\$20,000.00
Chapter 234, Acts of 1937 . . . . .	12,000.00
Chapter 434, Acts of 1937 . . . . .	14,000.00

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	\$46,000.00
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Expended to Nov. 30, 1937 . . . . .	21,839.91
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	\$24,160.09
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Chapter 356, Acts of 1938 . . . . .	10,000.00
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Chapter 497, Acts of 1938 . . . . .	16,000.00
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	\$50,160.09	\$37,732.25	\$12,427.84
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**Repairs, Lynn Sea Wall:**

Chapter 304, Acts of 1936 . . . . .	\$10,000.00
Chapter 234, Acts of 1937 . . . . .	11,000.00

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	\$21,000.00
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Expended to Nov. 30, 1937 . . . . .	20,805.45
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	\$194.55
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\$194.55

**Flood Damage:**

Chapter 432, Acts of 1936 . . . . .	\$30,000.00
Expended to Nov. 30, 1937 . . . . .	29,514.01

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	\$485.99
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\$441.49

\$44.50\*

**Bulkhead, Lynn Playground:**

Chapter 437, Acts of 1936 . . . . .	\$10,000.00
Expended to Nov. 30, 1937 . . . . .	9,981.88

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	\$18.12
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\$18.12\*

**Improving Wollaston Beach:**

Chapter 234, Acts of 1937 . . . . .	\$6,000.00
Expended to Nov. 30, 1937 . . . . .	4,300.66

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	\$1,699.34
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\$727.24

\$972.10

**Sundry Investigations:**

Chapter 434, Acts of 1937 . . . . .	\$4,500.00
Expended to Nov. 30, 1937 . . . . .	2,887.28

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	\$1,612.72
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\$825.00

\$787.72

**Storm Damages, Revere, Winthrop and  
Quincy Shores:**

Chapter 434, Acts of 1937 . . . . .	\$2,000.00
Expended to Nov. 30, 1937 . . . . .	-

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	\$2,000.00
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\$2,000.00

**Sewer Extension, Nahant Beach:**

Chapter 434, Acts of 1937 . . . . .	\$1,200.00
Expended to Nov. 30, 1937 . . . . .	970.00

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	\$230.00
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\$230.00

\*Reverted.

Maintenance (Continued)

	CONDITION OF FUND AS OF DEC. 1, 1937	AMOUNT AVAILABLE 1938	EXPENDED 1938	BALANCE DEC. 1, 1938
Parks Division (Continued)				
Metropolitan Parks Maintenance Fund:				
Specials (Continued):				
Repairs, Shelters at Revere Beach:				
Chapter 434, Acts of 1937 . . . . .	\$10,000.00			
Expended to Nov. 30, 1937 . . . . .	32.60			
		\$9,967.40	\$9,077.14	\$890.26
Renovating Magazine Beach Bath House:				
Chapter 434, Acts of 1937 . . . . .	\$15,000.00			
Expended to Nov. 30, 1937 . . . . .	-			
		\$15,000.00		
Chapter 497, Acts of 1938 . . . . .		3,700.00		
		\$18,700.00	\$15,054.00	\$3,646.00
Repairs, Sea Wall Winthrop:				
Chapter 434, Acts of 1937 . . . . .	\$4,000.00			
Expended to Nov. 30, 1937 . . . . .	2,068.42			
		\$1,931.58	\$680.00	\$1,251.58*
Repairs—Sea Wall Winthrop:				
Chapter 356, Acts of 1938 . . . . .		\$40,000.00	\$24,923.43	\$15,076.57
Esplanade Concerts:				
Chapter 356, Acts of 1938 . . . . .		\$5,000.00	\$5,000.00	-
Gypsy Moth Suppression:				
Chapter 356, Acts of 1938 . . . . .		\$25,000.00	\$14,425.95	\$10,574.05
Dredging Mystic Lake:				
Chapter 497, Acts of 1938 . . . . .		\$100,000.00	\$26.25	\$99,973.75
Shore Protection, Winthrop:				
Chapter 497, Acts of 1938 . . . . .		\$3,000.00	\$2,999.90	\$.10
Metropolitan Parks Maintenance Fund, Boulevards:				
General:				
Chapter 356, Acts of 1938 . . . . .		\$743,135.00		
Chapter 497, Acts of 1938 . . . . .		4,092.00		
Balance brought forward from 1937 appropriation to cover 1937 expenditures on 1938 books . . . . .		23,858.45		
		\$771,085.45	\$680,506.98	\$90,578.47
Specials:				
Boulevard, Fellsway to Mystic Avenue, Medford:				
Chapter 460, Acts of 1931 . . . . .	\$189,473.68			
Chapter 170, Acts of 1932 . . . . .	210,526.32			
Chapter 384, Acts of 1934 . . . . .	100,000.00			
Chapter 497, Acts of 1935 . . . . .	20,000.00			
	\$520,000.00			
Expended to Nov. 30, 1937 . . . . .	518,450.75			
		\$1,549.25	-	\$1,549.25
Brookline-Newton Boulevard:				
Chapter 460, Acts of 1931 . . . . .	\$231,578.95			
Chapter 170, Acts of 1932 . . . . .	168,421.05			
	\$400,000.00			
Expended to Nov. 30, 1937 . . . . .	300,832.53			
		\$99,167.47	-	\$99,167.47*
Grading and Landscaping:				
Chapter 304, Acts of 1936 . . . . .	\$25,000.00			
Expended to Nov. 30, 1937 . . . . .	23,835.83			
		\$1,164.17	\$391.75	\$772.42*
Expenses for Procuring W.P.A. Funds:				
Chapter 304, Acts of 1936 . . . . .	\$13,000.00			
Chapter 234, Acts of 1937 . . . . .	8,000.00			
Chapter 434, Acts of 1937 . . . . .	16,000.00			
	\$37,000.00			
Expended to Nov. 30, 1937 . . . . .	24,578.80			
		\$12,421.20		
Chapter 356, Acts of 1938 . . . . .		24,000.00		
		\$36,421.20	\$10,184.56	\$26,236.64
Flood Damage:				
Chapter 432, Acts of 1936 . . . . .	\$20,000.00			
Expended to Nov. 30, 1937 . . . . .	18,563.93			
		\$1,436.07	\$1,055.92	\$380.15*
Tablets for Bridges:				
Chapter 434, Acts of 1937 . . . . .	\$1,500.00			
Expended to Nov. 30, 1937 . . . . .	23.65			
		\$1,476.35	\$774.00	\$702.35
Additional Street Lighting:				
Chapter 234, Acts of 1937 . . . . .	\$32,000.00			
Expended to Nov. 30, 1937 . . . . .	6,581.88			
		\$25,418.12	\$22,912.08	\$2,506.04*

\*Reverted.

## Maintenance (Continued)

	CONDITION OF FUND AS OF DEC. 1, 1937	AMOUNT AVAILABLE 1938	EXPENDED 1938	BALANCE DEC. 1, 1938
Parks Division (Continued)				
Metropolitan Parks Maintenance Fund,				
Boulevards (Continued):				
Specials (Continued):				
Additional Street Lighting:				
Chapter 356, Acts of 1938 . . . . .		\$20,000.00	\$18,266.73	\$1,733.27
Drainage System, Medford:				
Chapter 356, Acts of 1938 . . . . .		\$4,000.00	\$34.40	\$3,965.60
Repairs Neponset River Bridge:				
Chapter 356, Acts of 1938 . . . . .		\$125,000.00	\$15,709.90	\$109,290.10
Resurfacing Boulevards and Parkways:				
Unexpended balance reappropriated . . . . .		\$20,848.14		
Chapter 356, Acts of 1938 . . . . .		275,000.00		
		\$295,848.14	\$168,909.49	\$126,938.65
Less amount transferred to Traffic Circle on Revere				
Beach Parkway				
Mass. State Project D-209, P.W.A. No. 1585F . . . . .				22,000.00
				\$104,938.65
Resurfacing Boulevards and Parkways:				
Traffic Circle on Revere Beach Parkway				
Mass. State Project D-209, P.W.A. No. 1585F . . . . .		\$22,000.00	\$113.35	\$21,886.65
Charles River Basin Maintenance Fund:				
Chapter 356, Acts of 1938 . . . . .		\$240,910.00		
Chapter 497, Acts of 1938 . . . . .		29,725.00		
Balance brought forward from 1937 appropriation to cover				
1937 expenditures on 1938 books . . . . .		15,262.52		
		\$285,897.52	\$259,138.33	\$26,759.19
Metropolitan Parks Maintenance Fund, Nantasket:				
Chapter 356, Acts of 1938 . . . . .		\$103,030.00		
Chapter 497, Acts of 1938 . . . . .		1,300.00		
Balance brought forward from 1937 appropriation to cover				
1937 expenditures on 1938 books . . . . .		7,976.51		
		\$112,306.51	\$104,315.04	\$7,991.47
Metropolitan Parks Maintenance Fund, Wellington Bridge:				
Chapter 356, Acts of 1938 . . . . .		\$13,600.00		
Balance brought forward from 1937 appropriation to cover				
1937 expenditures on 1938 books . . . . .		892.24		
		\$14,492.24	\$13,090.67	\$1,401.57
Maintenance of Bunker Hill Monument:				
Chapter 356, Acts of 1938 . . . . .		\$17,600.00		
Chapter 497, Acts of 1938 . . . . .		100.00		
Balance brought forward from 1937 appropriation to cover				
1937 expenditures on 1938 books . . . . .		249.00		
		\$17,949.00	\$15,661.89	\$2,287.11

## SEWERAGE DIVISION

Metropolitan Sewerage Maintenance Fund, North System:				
General:				
Chapter 356, Acts of 1938 . . . . .		\$421,100.00		
Chapter 497, Acts of 1938 . . . . .		1,578.00		
Balance brought forward from 1937 appropriation to				
cover 1937 expenditures on 1938 books . . . . .		9,522.56		
		\$432,200.56	\$422,760.13	\$9,440.43
Specials:				
Deer Island Wharf:				
Chapter 234, Acts of 1937 . . . . .	\$2,000.00			
Expended to Nov. 30, 1937 . . . . .	38.90			
		\$1,961.10	-	\$1,961.10
Trestle, Deer Island:				
Chapter 234, Acts of 1937 . . . . .	\$20,000.00			
Expended to Nov. 30, 1937 . . . . .	15,692.38			
		\$4,307.62	-	\$4,307.62
Boilers, East Boston Pumping Station:				
Chapter 234, Acts of 1937 . . . . .	\$15,000.00			
Expended to Nov. 30, 1937 . . . . .	64.12			
		\$14,935.88	\$10,914.00	\$4,021.88*
Boilers, East Boston Pumping Station:				
Chapter 356, Acts of 1938 . . . . .		\$40,000.00	\$1,926.00	\$38,074.00
Metropolitan Sewerage Maintenance Fund, South System:				
Chapter 356, Acts of 1938 . . . . .		\$297,500.00		
Chapter 497, Acts of 1938 . . . . .		1,547.00		
Balance brought forward from 1937 appropriation to cover				
1937 expenditures on 1938 books . . . . .		1,807.61		
		\$300,854.61	\$278,025.00	\$22,829.61

\*Reverted.



Maintenance (Continued)

	CONDITION OF FUND AS OF DEC. 1, 1937	AMOUNT AVAILABLE 1938	EXPENDED 1938	BALANCE DEC. 1, 1938
WATER DIVISION				
Metropolitan Water Maintenance Fund:				
General:				
Chapter 356, Acts of 1938		\$1,015,825.00		
Chapter 497, Acts of 1938		3,665.00		
Balance brought forward from 1937 appropriation to cover 1937 expenditures on 1938 books		24,891.06		
		<u>\$1,044,381.06</u>	\$999,812.23	\$44,568.83
Special:				
Repairs to Water Main:				
Chapter 434, Acts of 1937	\$10,000.00			
Expended to Nov. 30, 1937	5,920.45			
	<u>                    </u>	\$4,079.55	-	\$4,079.55

Receipts — Year Ended November 30, 1938

PARKS DIVISION

Not available for expenditure:				
Credited to:				
Charles River Basin Maintenance Fund		\$ .88		
Metropolitan Parks Fund, Special		100,215.33		
Metropolitan Parks Maintenance Fund, General		33,029.08*		
Metropolitan Parks Maintenance Fund, Boulevards		752.73		
General Revenue		3,577.25		
		<u>                    </u>	\$137,575.27	
Available for expenditure (added to funds):				
Credited to:				
Edwin U. Curtis Memorial Trust Fund		\$63.00		
George R. Nutter Trust Fund		1,000.00		
		<u>                    </u>	1,063.00	
			<u>                    </u>	\$138,638.27

SEWERAGE DIVISION

Not available for expenditure:				
Credited to:				
Metropolitan Sewerage Sinking Fund, North System		\$927.00		
Metropolitan Sewerage Sinking Fund, South System		48.00		
Metropolitan Sewerage Maintenance Fund, North System		6,972.02**		
Metropolitan Sewerage Maintenance Fund, South System		6,900.01***		
Metropolitan Sewerage Interest Fund, North System		103.00		
Metropolitan Sewerage Interest Fund, South System		4.00		
		<u>                    </u>	\$14,954.03	
Available for expenditure (added to fund):				
Credited to:				
Metropolitan Sewerage Construction Fund, North System				
Massachusetts State Project D-101, P.W.A. Docket No. Mass. 1098R			694.00	
			<u>                    </u>	\$15,648.03

WATER DIVISION

Not available for expenditure:				
Credited to:				
Metropolitan Water Loan Interest Fund		\$44.00		
Metropolitan Water Sinking Fund		126,290.85		
Metropolitan Water Maintenance Fund		15,159.72****		
		<u>                    </u>	\$141,494.57	
Available for expenditure (added to fund):				
Credited to:				
Metropolitan Water Construction Fund			456.06	
			<u>                    </u>	\$141,950.63
				<u>\$296,236.93</u>

\*Includes Prior Years Account \$6.42.  
\*\*Includes Prior Years Account \$72.05.  
\*\*\*Includes Prior Years Account \$6.11.  
\*\*\*\*Includes Prior Years Account \$50.42.

Approved.

GEO. E. MURPHY,  
Comptroller.

## APPENDIX No. 2

TABLE 1

*The following is a record of the traffic through locks and drawbridges during the year.*

*Charles River Dam Lock and Drawbridge*

Number of openings of highway drawbridge . . . . .	1,753
Number of openings of lock . . . . .	4,122
Number of vessels . . . . .	1,737
Number of small boats . . . . .	7,762
Number of rafts . . . . .	2
Coal (tons) . . . . .	8,727
Sand (tons) . . . . .	145,938
Gravel (tons) . . . . .	49,110
Oil (bbls.) . . . . .	292,500
Oil (gals.) . . . . .	21,308,000
Granite (tons) . . . . .	690
Mud (tons) . . . . .	600
Lumber (ft. B. M.) . . . . .	1,119,000
Coal Tar (gals.) . . . . .	215,000

*Cradock Bridge Lock*

Number of openings . . . . .	240
Number of boats through lock . . . . .	255
Number of boats over rolls . . . . .	75

*Dorchester Bay Drawbridge*

Number of openings . . . . .	960
Number of vessels . . . . .	1,076

*General Edwards Drawbridge*

Number of openings . . . . .	190
Number of vessels . . . . .	311

*Malden River Drawbridge*

Number of openings . . . . .	160
Number of vessels . . . . .	316

*Mystic River Drawbridge*

Number of openings . . . . .	15
Number of vessels . . . . .	10

*Neponset River Drawbridge*

Number of openings . . . . .	245
Number of vessels . . . . .	379

*Wellington Drawbridge*

Number of openings . . . . .	26
Number of vessels . . . . .	28

TABLE 4

*Lengths of Roads and Bridle Paths in Reservations not Open to Motor Vehicles*

	Miles
Blue Hills Reservation . . . . .	79.08
Middlesex Fells Reservation . . . . .	27.25
Stony Brook Reservation . . . . .	24.60
Beaver Brook Reservation . . . . .	.22
Charles River Reservation . . . . .	4.39
Hammond Pond Parkway . . . . .	2.00
Breakheart Reservation . . . . .	5.00

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 142.54

TABLE 2.—Metropolitan Park System—Areas of Reservations and Parkways—December 31, 1938.

		(RESERVATIONS ACRES)															(PARKWAYS ACRES)															Grand Total Reservations and Parkways (Acres)											
		Beaver Brook	Blue Hills	Breakheart	Bunker Hill	Charles River	Hemlock Gorge	King's Beach and Lynn Shore	Middlesex Fells	Mystic River	Nantasket Beach	Neponset River	Quincy Shore	Revere Beach	Stony Brook	Winthrop Shore	Total Acres	Alewite Brook	Blue Hills	Veterans of Foreign Wars	Dedham	Fresh Pond	Furnace Brook	Hammond Pond	Lynn Fells	Lynnway	Middlesex Fells	Mystic Valley	Nahant Beach	Neponset River	Old Colony			Quannapowitt	Revere Beach	West Roxbury	Winthrop	Woburn	Total Acres				
1	Cities.	-	-	-	6.05	204.33	-	-	-	-	145.57	-	-	463.65	-	819.60	-	.20	49.54	21.98	-	-	-	-	-	-	-	28.80*	59.12	-	-	-	-	-	-	-	236.34	1,055.94	1				
2	Boston	-	-	-	-	224.02	-	-	-	-	-	-	-	-	-	224.02	86.21	-	-	-	12.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	98.61	322.63	2					
3	Cambridge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.36	21.36	3						
4	Chelsea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31.37	31.37	4					
5	Everett	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.25	20.84	5					
6	Lynn	-	-	-	-	-	-	19.59	-	-	-	-	-	-	-	19.59	-	-	-	-	-	-	-	-	.93	-	-	-	-	-	-	-	-	-	-	-	23.58	59.53	6				
7	Malden	-	-	-	-	-	-	-	59.53	-	-	-	-	-	-	59.53	-	-	-	-	-	-	-	-	-	-	23.58	-	-	-	-	-	-	-	-	-	23.58	83.11	7				
8	Medford	-	-	-	-	-	-	-	969.87	42.32	-	-	-	-	-	1,012.19	-	-	-	-	-	-	-	-	-	45.01	280.72	-	-	-	-	-	-	-	-	-	333.83	1,346.02	8				
9	Melrose	-	-	-	-	-	-	-	180.19	-	-	-	-	-	-	180.19	-	-	-	-	-	-	-	14.28	-	-	-	-	-	-	-	-	-	-	-	-	-	14.28	194.47	9			
10	Newton	-	-	-	-	187.63	4.24	-	-	-	-	-	-	-	-	191.87	-	-	-	-	-	117.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	117.46	309.33	10			
11	Quincy	-	2,562.56	-	-	-	-	-	-	-	-	-	40.75	-	-	2,603.31	-	-	-	-	-	101.12	-	-	-	-	-	-	-	-	2.72	-	-	-	-	-	-	103.84	2,707.15	11			
12	Revere	-	-	-	-	-	-	-	-	-	-	-	-	64.31	-	64.31	-	-	-	-	-	-	-	-	7.72	-	-	-	-	-	-	67.22	-	8.61	-	-	-	83.55	147.86	12			
13	Somerville	-	-	-	-	-	-	-	-	5.91	-	-	-	-	-	5.91	5.36	-	-	-	-	-	-	-	-	-	11.83	4.95	-	-	-	-	-	-	-	-	-	-	22.14	28.05	13		
14	Waltham	42.77	-	-	-	38.71	-	-	-	-	-	-	-	-	-	81.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	81.48	14			
15	Woburn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22.63	22.63	22.63	22.63	15					
16	Towns.	-	-	-	-	-	-	-	-	7.83	-	-	-	-	-	7.83	28.10	-	-	-	-	-	-	-	-	-	-	17.02	-	-	-	-	-	-	-	-	-	45.12	52.95	16			
17	Arlington	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.43	35.98	17				
18	Belmont	15.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69.75	18			
19	Braintree	-	69.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	91.66	91.66	19		
20	Brookline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.96	-	-	-	75.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	964.85	19		
21	Canton	-	700.59	-	-	-	-	-	-	-	-	264.26	-	-	-	964.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	241.05	256.21	20	
22	Dedham	-	-	-	-	6.51	-	-	-	-	-	234.54	-	-	-	241.05	-	-	-	15.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.16	256.21	21	
23	Dover	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22		
24	Hingham	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23		
25	Hull	-	-	-	-	-	-	-	-	-	25.59	-	-	-	-	25.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25.59	24		
26	Milton	-	1,555.78	-	-	-	-	-	-	-	-	-	-	-	-	1,824.87	-	83.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	134.75	1,959.62	25	
27	Nahant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66.22	-	-	-	-	-	-	-	-	-	-	66.22	66.22	26		
28	Needham	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.24	26		
29	(Randolph)	-	885.25	-	-	-	14.24	-	-	-	-	-	-	-	-	14.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	885.25	27	
30	Saugus	-	-	532.05	-	-	-	-	-	-	-	-	-	-	-	532.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	532.05	28	
31	Stoneham	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	705.41	29		
32	Swampscott	-	-	-	-	-	-	3.10	-	-	-	-	-	-	-	705.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.10	30	
33	Wakefield	-	-	87.48	-	-	-	-	-	-	-	-	-	-	-	87.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.48	31	
34	Watertown	-	-	-	-	80.95	-	-	-	-	-	-	-	-	-	80.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80.95	32	
35	Wellesley	-	-	-	-	66.07	4.58	-	-	-	-	-	-	-	-	70.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70.65	33	
36	Weston	-	-	-	-	152.52	-	-	-	-	-	-	-	-	-	152.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	152.52	34	
37	Westwood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.57	35	
38	Weymouth	-	-	-	-	-	-	-	-	-	6.57	-	-	-	-	6.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.57	36
39	Winchester	-	-	-	-	-	-	-	261.93	-	-	-	-	-	-	261.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	261.93	37
40	Winthrop	-	-	-	-	-	-	-	-	-	-	-	16.83	-	-	16.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.83	16.83	38
		58.32	5,773.93	619.53	6.05	960.74	23.06	22.69	2,176.93	56.06	25.59	920.03	40.75	64.31	463.65	16.83	11,228.47	140.10	83.51	52.50	37.14	12.40	101.12	192.50	39.78	8.65	80.42	344.97	66.54	80.24	61.84	15.54	128.05	90.36	8.74	23.23	1,567.63	12,796.10					

\*Includes East Milton St. from Wolcott Square to Paul's Bridge.



The foll

Number  
Number  
Number  
Number  
Number  
Coal (to  
Sand (to  
Gravel (to  
Oil (bbls  
Oil (gals  
Granite  
Mud (to  
Lumber  
Coal Tar

Number  
Number  
Number

Number  
Number

Number  
Number

Number  
Number

Number  
Number

Number  
Number

Number  
Number

Lengths c

Blue Hills  
Middlesex  
Stony Br  
Beaver B  
Charles I  
Hammond  
Breakhead

Location	Gravel (cu yd)	Sand (cu yd)	Coal (cu yd)	Oil (bbls)	Oil (gals)	Granite (cu yd)	Mud (cu yd)	Lumber (cu yd)	Coal Tar (cu yd)
Blue Hills	100	200	300	400	500	600	700	800	900
Middlesex	110	210	310	410	510	610	710	810	910
Stony Br	120	220	320	420	520	620	720	820	920
Beaver B	130	230	330	430	530	630	730	830	930
Charles I	140	240	340	440	540	640	740	840	940
Hammond	150	250	350	450	550	650	750	850	950
Breakhead	160	260	360	460	560	660	760	860	960

TABLE 3.—Metropolitan Park System—Mileage of Roadways—December 31, 1938.

		Alewife Brook Parkway	Blue Hills Parkway		Blue Hills Res.	Veterans of Foreign Wars Parkway	Charles River Res.		Dedham Parkway	East Milton Street		Fresh Pond Parkway	Furnace Brook Parkway	Hammond Pond Parkway	Lynn Fells Parkway	Lynn Shore Res.	Lynnway	Memorial Drive		Middlesex Fells Parkway		Middlesex Fells Res.		Mystic Valley Parkway		Nahant Beach Park- way	Nantasket Beach Res.	Neponset River Parkway	Old Colony Boulevard	Quannapowitt Parkway	Quincy Shore Res.	Revere Beach Parkway		Revere Beach Res.	Stony Brook Res.	West Roxbury Parkway	Winthrop Parkway	Winthrop Shore Res.	Woburn Parkway	TOTAL MILES		Grand Total Miles																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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\*Equivalent in miles of single roadway—26.06 miles.





TABLE 5

*Electric Street Lights on Parkways and Reservations*

	Lights	
Alewife Brook Parkway (12-600 c.p., 36-800 c.p., 1-1500 c.p.)	49	
Blue Hills Parkway (600 c.p.)	59	
Blue Hills Reservation, Hillside Street (80 c.p.)	14	
Breakheart Reservation Entrance (2-800 c.p., 5-100 c.p.)	7	
Charles River Dam, Reservation (1500 c.p.)	9	
Charles River Dam, Roadway (1000 c.p.)	20	
Charles River Reservation, Boston Embankment (250 c.p.)	80	
Charles River Reservation, Embankment Road (2-100 c.p., 17-600 c.p.)	19	
Charles River Reservation, North Beacon Street (4-1500 c.p., 9-1000 c.p.)	13	
Charles River Reservation, Soldiers' Field Road (63-1000 c.p., 54-1500 c.p.)	117	
Dorchester Bay Bridge (1500 c.p.)	8	
Fresh Pond Parkway (15-250 c.p.)	15	
Furnace Brook Parkway (600 c.p.)	58	
General Edwards Bridge (800 c.p.)	24	
Harvard Bridge (600 c.p.)	24	
High Street Bridge (600 c.p.)	6	
Larz Anderson Bridge (100 c.p.)	24	
Lynn Fells Parkway (600 c.p.)	28	1
Lynn Shore Reservation (4-1000 c.p., 44-600 c.p.)	48	2
Lynnway (1-1000 c.p., 16-800 c.p.)	17	
Memorial Drive (32-600 c.p., 213-250 c.p.)	245	
Middlesex Fells Parkway (7-1500 c.p., 236-600 c.p., 5-800 c.p.)	248	
Middlesex Fells Reservation (2-80 c.p., 35-250 c.p., 30-600 c.p.)	67	
Mystic Valley Parkway (1-250 c.p., 83-600 c.p., 78-800 c.p.)	162	3
Nahant Beach Parkway (600 c.p.)	16	4
Nantasket Beach Reservation (1000 c.p.)	50	5
Neponset Bridge (600 c.p.)	16	
Neponset Valley Parkway (600 c.p.)	21	
Old Colony Parkway (47-1500 c.p., 2-1000 c.p.)	49	
Quincy Shore Boulevard (600 c.p.)	57	
Revere Beach Parkway (193-600 c.p., 2-800 c.p.)	195	
Revere Beach Reservation (2-60 c.p., 1-250 c.p., 107-1500 c.p.)	110	6
River Street Bridge (250 c.p.)	8	
Weeks Bridge (100 c.p.)	24	
Wellington Bridge (800 c.p.)	22	
Western Avenue Bridge (250 c.p.)	8	
West Roxbury Parkway (28-600 c.p., 2-1000 c.p.)	30	7
Winthrop Parkway (14-250 c.p., 7-600 c.p.)	21	
Winthrop Shore Reservation (600 c.p.)	23	
Woburn Parkway (600 c.p.)	4	8

2015

<sup>1</sup>Seventeen all year until 1 A.M.  
<sup>2</sup>Three 600 c.p. June 1 to December 1.  
<sup>3</sup>Ten 600 c.p. all night, except November 1 to March 31 until 1 A.M. Thirty-three 600 c.p. all year until 1 A.M. One 800 c.p. all year until 1 A.M.  
<sup>4</sup>Four June 1 to December 1.  
<sup>5</sup>Twelve June 1 to October 31. Seventeen in summer only.  
<sup>6</sup>Twenty-seven 1,500 c.p. all night, May 1 to October 31. Thirty-one 1,500 c.p. to midnight, June 1 to September 30. One 60 c.p. all night, May 1 to September 30.  
<sup>7</sup>Twenty-eight 600 c.p. all night, except November 1 to March 31, until 1 A.M.  
<sup>8</sup>Until 1 A.M.

TABLE 6

*Miles of Seashore*

	Miles
Lynn Shore . . . . .	1.50
Nahant Beach . . . . .	2.93
Nantasket Beach . . . . .	1.02
Quincy Shore . . . . .	2.19
Revere Beach . . . . .	2.74
Winthrop Shore . . . . .	1.71
Total . . . . .	12.09

*Lengths of Sea Walls*

	Miles
Lynn Shore . . . . .	1.30
Nahant Beach Parkway, north of Wilson Road . . . . .	.35
Nantasket Beach Reservation . . . . .	1.02
Quincy Shore Reservation, shore protection south of Webster Street	1.08
Quincy Shore Reservation, southerly end . . . . .	.15
Revere Beach at Eliot Circle . . . . .	.15
Revere Beach at Northern Circle . . . . .	.08
Revere Beach, shore protection, south of Northern Circle . . . . .	.28
Revere Beach, shore protection, bathhouse shelter to Revere Street shelter . . . . .	.29
Winthrop Parkway, Revere and Winthrop, Broad Sound Avenue to Sewall Avenue . . . . .	.52
Winthrop Shore, bridge to Great Head . . . . .	1.04
Winthrop Shore, bridge to Grover's Cliff . . . . .	.23
Total . . . . .	6.49

*Miles of River Bank*

	Miles
Alewife Brook . . . . .	4.50
Charles River . . . . .	33.97
Mystic River . . . . .	8.41
Neponset River . . . . .	15.86
Total . . . . .	62.74

TABLE 7

*Bridges*

Drawbridges . . . . .	7
Footbridges . . . . .	14
Reinforced concrete bridges . . . . .	25
Steel bridges . . . . .	18
Stone masonry bridge . . . . .	1
Wooden bridges . . . . .	5
Total . . . . .	70

*Culverts*

Reinforced concrete and other masonry culverts . . . . .	60
--	----

TABLE 8

Beaver Brook Reservation, small wooden dams . . . . .	2
Blue Hills Parkway, small wooden dam at Canton Avenue Circle .	1
Blue Hills Reservation, small wooden dams at St. Moritz . . .	2
Blue Hills Reservation, small concrete dam at Ponkapoag Pond .	1
Breakheart Reservation, small concrete dams . . . . .	2
Charles River Reservation, wooden dam at Watertown, 220 feet in length . . . . .	1
Charles River Reservation, Charles River Basin, tidal dam, 1,200 feet in length . . . . .	1
Charles River Reservation, small stone dam in branch below Wash- ington Street, Newton Lower Falls . . . . .	1
Charles River Reservation, reinforced concrete dam at Washing- ton Street, Newton Lower Falls, 140 feet in length . . . . .	1
Charles River Reservation, stone masonry dam with stop planks, at Moody Street Bridge, about 170 feet in length . . . . .	1
Furnace Brook Parkway, reinforced concrete dam upstream from Black's Creek Bridge . . . . .	1
Hemlock Gorge Reservation, small stone masonry dam with stop planks, in gorge . . . . .	1
Hemlock Gorge Reservation, small reinforced concrete dam on east branch of River, Newton Upper Falls . . . . .	1
Hemlock Gorge Reservation, reinforced concrete dam in Charles River at Boylston Street, Newton Upper Falls, 90 feet in length	1
Hemlock Gorge Reservation, small concrete dam at Reservoir Street	1
Mystic River Reservation, reinforced concrete tidal dam at Cra- dock Bridge, 100 feet in length, weirs 400 feet in length . . .	1
Total . . . . .	19

*Lock Gates, Sluice Gates and Tide Gates*

Charles River Reservation, Charles River Basin Tidal Dam, 6 lock  
gates, 13 sluice gates, 43 tide gates.  
Mystic River Reservation, Cradock Bridge Tidal Dam, 2 lock gates,  
4 sluice gates, 8 tide gates.  
Quincy Shore Reservation, 8 tide gates.  
Old Colony Parkway, Tenean Street, 1 tide gate.  
Mystic Valley Parkway, 1200 feet west of Fellsway, 1 tide gate.



TABLE 9

## CONTRACTS MADE AND PENDING DURING

Contract Number	WORK	Number of Bids	Lowest
326	Alterations to the Magazine Beach Bath House, Memorial Drive, Cambridge (Maintenance Work)	8	\$14,550.00
327	Reconstructing two 18-inch reinforced concrete pipes, Soldiers Field Road, near Western Avenue, Boston (Brighton District)	17	1,225.00
328	Resurfacing portion of Mystic Valley Parkway at River Street, Arlington	7	1,348.00
329	Smoke screens and handrails at the Nantasket Hotel and Restaurant, Nantasket Beach Reservation, Hull	8	2,575.00
330	Resurfacing of Quincy Shore Boulevard from Furnace Brook Parkway to Sea Street, Quincy	6	7,949.10
331	Resurfacing of the approaches to Mystic River Bridge, Mystic Valley Parkway and resurfacing a portion of Fellsway West at Brooks Road Overpass, Medford	6	2,000.00
332	Reconstructing Hillcrest Parkway from near Highland Avenue to Appalachian Road, Winchester	8	30,982.00
333	Reconstructing Blue Hill Street and Hillside Street from Washington Street to main entrance to Houghton's Pond, Canton and Milton.	9	39,999.99
334	Bathhouse on the southerly side of Pleasant Street, about 700 feet east of Green Street, on the Charles River, Watertown	21	37,950.00
335	Repairs to sea wall and roadway along Winthrop Shore Reservation, Moore Street to Tewksbury Street, Winthrop	23	17,184.00
336	Installing certain cables, wiring poles, and enlarging manhole in the Mystic Valley Parkway from Mystic Avenue to Middlesex Fells Parkway, Medford	8	1,100.00
337	Reconstruction of the easterly roadway of Fellsway East from Savin Street to Highland Avenue and construction of traffic ellipse at Highland Avenue, Middlesex Fells Parkway, Malden	10	18,111.11
338	Dredging a portion of Upper Mystic Lake and incidental work, Mystic Valley Parkway, Winchester	7	79,800.00
339	Traffic control signals, signs, and lines for the intersection of Revere Beach Parkway with Webster Avenue and Garfield Avenue, Chelsea	3	
340	Constructing stone jetty off Winthrop Shore Reservation at the circle near Beacon Street, Winthrop	5	4,095.00
341	Reconstruction of Elm Street, Medford, Middlesex Fells Reservation, from Fellsway West to Highland Avenue	10	47,744.00
342	Reconstruction of tennis courts, Riverside Recreation Grounds, Weston	4	
343	Boat house and recreation building at lagoon between Exeter Street and Fairfield Street, Charles River Basin, Boston	13	
343-A	Boat house and recreation building at lagoon between Exeter Street and Fairfield Street, Charles River Basin, Boston	11	87,900.00
344	Reconstruction of and repairs to Neponset River Drawbridge and the approach spans, Old Colony Parkway, Boston and Quincy	10	68,000.00
345	Repairs to shore protection Endicott Avenue to Broad Sound Avenue, Winthrop Parkway, Revere	8	1,761.00
346	Regrading northwesterly slope and reconstructing walks, curbs, and drains at Bunker Hill Reservation, Charlestown	8	2,580.30
347	Repairing the draw span at the Dorchester Bay Bridge, Old Colony Parkway, Dorchester District of Boston	7	2,225.00
348	Furnishing and installing two 24-inch reinforced concrete pipe drains, reconstructing sections of headwalls and constructing wooden sump boxes on Lynn Fells Parkway at Melrose Street, Melrose	18	1,487.00
349	Proposed reconstruction of sea wall and steps, Herbert Road to Channing Street, Quincy Shore Reservation, Quincy	18	6,115.00
350	Repairs to draw span at Charles River Dam, Charles River Reservation, Lower Basin, Boston and Cambridge	3	2,300.00
351	Reconstruction of tennis courts, Riverside Recreation Grounds, Weston	5	4,886.50
352	Grading and driveway surfacing at the Charles River Locks Stop Plank House and Garage, Charles River Reservation, Lower Basin, Boston	7	1,184.00
353	Repairs to wearing surface and decking at Harvard Bridge, Charles River Reservation, Lower Basin, Boston and Cambridge	7	1,995.00
354	Replacing a portion of the steam line between lock wall and sluices at the Charles River Dam, Charles River Reservation, Lower Basin, Boston	5	2,442.50
355	Repairs to edgestone and sidewalks at the River Street Bridge, Charles River Reservation, Boston and Cambridge	2	1,752.50
	Traffic circle at West Roxbury Parkway and Centre Street, West Roxbury District of Boston, P.W.A. Docket No. Mass. 1510, Mass. State Project No. D-207	9	58,850.22
356	Repairs to lock gates at Cradock Dam, Mystic Valley Parkway, Medford	2	5,989.40
357	Repairs to cement concrete walks at the Charles River Dam, Charles River Reservation, Lower Basin, Boston and Cambridge	8	2,145.50
358	Alterations to the Magazine Beach Bathhouse and installation of heating in the Magazine Beach Sanitary, Memorial Drive, Cambridge	7	3,480.00

TABLE 9

THE YEAR 1938 — PARKS DIVISION

CONTRACTOR	Date of Contract	Date of Completion of Contract	Value of Work Done Dec. 31, 1938
Maurice M. Devine, Inc. . . . .	Apr. 28, 1938	July 8, 1938	\$15,000.00
John Williams . . . . .	May 12, 1938	June 23, 1938	1,225.00
M. McDonough Corp. . . . .	May 12, 1938	May 18, 1938	1,460.54
Dunn-Galvin Corp. . . . .	May 12, 1938	June 15, 1938	2,481.50
Old Colony Asphalt Concrete Company . .	June 9, 1938	Aug. 19, 1938	8,048.00
M. McDonough Corp. . . . .	June 9, 1938	July 28, 1938	2,000.00
George Rotondi & Son . . . . .	June 9, 1938	Sept. 26, 1938	32,097.00
C. & R. Construction Co. . . . .	June 9, 1938	Sept. 2, 1938	40,310.37
Platt Contracting Co., Inc. . . . .	June 23, 1938	—	36,000.00
Anthony Ross & Son, Inc. . . . .	June 23, 1938	Sept. 28, 1938	19,981.70
*New England Sales & Manufacturing Corp. .	July 7, 1938	Sept. 12, 1938	1,100.00
C. & R. Construction Co. . . . .	June 30, 1938	Sept. 2, 1938	18,111.11
C. & R. Construction Co. . . . .	Nov. 23, 1938	—	—
No bid accepted—a traffic circle is being constructed to eliminate the necessity of traffic lights . .	—	—	—
George M. Bryne . . . . .	Aug. 11, 1938	Sept. 9, 1938	4,847.70
M. McDonough Corporation . . . . .	Aug. 25, 1938	—	48,256.00
Bids rejected . . . . .	—	—	—
Bids rejected . . . . .	—	—	—
Vincent Caira . . . . .	Sept. 15, 1938	—	25,719.75
Coleman Bros. Corp. . . . .	Sept. 8, 1938	—	30,000.00
Vulcan Construction Co. . . . .	Sept. 1, 1938	Sept. 13, 1938	2,971.10
J. J. Callahan . . . . .	Sept. 8, 1938	Nov. 18, 1938	4,185.75
Frederick W. Byron and Maurice M. Devine .	Sept. 22, 1938	Oct. 17, 1938	2,669.39
Federal Contracting Co., Inc. . . . .	Sept. 15, 1938	Nov. 9, 1938	2,091.57
Charles Struzziery . . . . .	Sept. 15, 1938	Oct. 28, 1938	6,662.50
Oscar H. Horovitz Co. . . . .	Sept. 15, 1938	Nov. 25, 1938	2,950.00
Greenough Brothers, Inc. . . . .	Sept. 22, 1938	—	—
Vulcan Construction Co. . . . .	Oct. 13, 1938	Oct. 22, 1938	1,184.00
Vulcan Construction Co. . . . .	Oct. 20, 1938	Nov. 21, 1938	3,720.65
Acme Heating and Ventilating Co. . . . .	Nov. 10, 1938	Dec. 13, 1938	2,442.50
Vulcan Construction Co. . . . .	Oct. 27, 1938	Dec. 3, 1938	3,370.00
M. DeMatteo Construction Co. . . . .	Nov. 3, 1938	—	8,324.50
Frederick W. Byron . . . . .	Nov. 3, 1938	—	3,500.00
Keystone Engineering and Contracting Co. .	Nov. 3, 1938	—	1,693.75
Platt Contracting Co., Inc. . . . .	Nov. 30, 1938	—	900.00

\*Second lowest bidder.

TABLE 9

## CONTRACTS MADE AND PENDING DURING

Contract Number	WORK	Number of Bids	Lowest
359	Drainage improvements and tide gate installation at Mystic Valley Parkway, Medford	10	\$4,240.00
360	Construction of sanitary building on Revere Beach Reservation at Shirley Avenue, Revere	6	18,403.00
361	Miscellaneous wood and steel repairs to Malden River Bridge, Revere Beach Parkway, Medford and Everett	3	1,788.00
	Road improvement near underpass at Columbia Circle, Old Colony Parkway, Dorchester District of Boston, P.W.A. Docket No. Mass. 1512-F, Mass. State Project No. D-206	7	78,575.21
	Overpass and traffic circle at Cottage Farm Bridge, Cambridge, Section 1, widening of bridge over Boston and Albany Railroad near Cottage Farm Bridge, Memorial Drive, Cambridge, P.W.A. Docket No. Mass. 1555-F, Mass. State Project No. D-210	9	34,846.72
	Traffic circle, Revere Beach Parkway at intersection of Garfield Avenue and Webster Avenue, Chelsea, P.W.A. Docket No. Mass. 1585, Mass. State Project No. D-209	4	22,992.29
362	Removal of standing trees and stumps of trees on parkways and on Middlesex Fells Reservation in Arlington, Cambridge, Somerville, Medford, Malden, Winchester, Stoneham, Wakefield and Woburn	21	13,754.00
363	Furnishing ordinary borrow and gravel borrow along the length of Wampatuck Road, Blue Hills Reservation, Quincy, in conjunction with W.P.A. road project now under construction	13	5,250.00

All contracts awarded to lowest bidders except where noted.



TABLE 9

THE YEAR 1938 — PARKS DIVISION — Concluded

CONTRACTOR	Date of Contract	Date of Completion of Contract	Value of Work Done Dec. 31, 1938
C. & R. Construction Co. . . . .	Nov. 10, 1938	—	—
Maurice M. Devine, Inc. . . . .	Nov. 30, 1938	—	—
Maurice M. Devine, Inc. . . . .	Nov. 23, 1938	—	1,686.20
Samuel J. Tomasello Corp. . . . .	Nov. 23, 1938	—	7,951.10
Coleman Brothers Corp. . . . .	Nov. 23, 1938	—	7,340.47
M. McDonough Corp. . . . .	Nov. 30, 1938	—	—
J. J. Callahan . . . . .	Nov. 30, 1938	—	8,000.00
C. A. Crowley . . . . .	Dec. 29, 1938	—	—



# APPENDIX No. 3

## Statistics of Police Department

### MISCELLANEOUS WORK DONE BY THE DEPARTMENT

Accidents reported . . . . .	1,880
Assistance rendered other police departments . . . . .	150
Buildings found open and secured . . . . .	108
Cases investigated . . . . .	486
Dead bodies found . . . . .	26
Defective streets reported . . . . .	37
Defective sidewalks reported . . . . .	18
Defective street lamps reported . . . . .	1,821
Fire alarms given . . . . .	58
Fires extinguished without alarm . . . . .	79
Injured and sick persons assisted . . . . .	1,945
Insane persons cared for . . . . .	33
Lost persons restored . . . . .	900
Persons rescued from drowning . . . . .	98
Water running to waste . . . . .	16
Dogs rescued from drowning . . . . .	1
Assistance rendered game wardens . . . . .	5
Fire alarms answered in cities and towns . . . . .	17
Wild steers shot . . . . .	3
Gas leaks reported . . . . .	1
Vessels assisted to anchorage . . . . .	14
Street obstructions removed . . . . .	4
Disturbances suppressed . . . . .	14
Runaways . . . . .	18
Cases of wayward girls and women and delinquent boys handled without court action . . . . .	90
Warnings of minor infractions of motor vehicle laws . . . . .	5,461

### List of Offences

Affray . . . . .	3
Accosting and annoying . . . . .	3
Assault with intent to maim . . . . .	1
Assault with dangerous weapon . . . . .	2
Assault and battery . . . . .	41
Assault and battery on a police officer . . . . .	1
Breaking and entering . . . . .	6
Breaking and entering and larceny . . . . .	2
Breaking and entering in night time . . . . .	2
Burglars tools in possession . . . . .	1
Breaking glass on public beach . . . . .	2
Contempt of court . . . . .	1
Default warrants . . . . .	24
Delinquency . . . . .	44
Drunkenness . . . . .	607
Disturbing peace . . . . .	7
Disturbing funeral procession . . . . .	1
Defacing property . . . . .	2
Defrauding Inn Keeper . . . . .	1
Defrauding Common Victualer . . . . .	3
Escaped from State Institutions . . . . .	1
False fire alarm . . . . .	1



For other police departments . . . . .	5
Forgery . . . . .	1
Fornication . . . . .	3
Improper use of life saving equipment . . . . .	1
Indecent exposure . . . . .	8
Illegal re-sale of tickets . . . . .	14
Larceny . . . . .	44
Larceny, attempted . . . . .	5
Larceny from person . . . . .	1
Larceny of Automobile . . . . .	8
Lewdness . . . . .	7
Manslaughter . . . . .	4
Robbery, armed . . . . .	4
Rape, assault with intent to . . . . .	1
Suspicious persons . . . . .	22
Using boat without authority . . . . .	4
Vagrancy . . . . .	9
Violation of probation . . . . .	13
Violation of true name law . . . . .	2

*Offences Against the Motor Vehicle Laws*

Allowing operation of uninsured car . . . . .	3
Allowing operation of unregistered car . . . . .	3
Allowing operation after revocation of registration . . . . .	1
Allowing improper person to operate . . . . .	8
Failing to stop at through way . . . . .	11
Failing to stop for police officer . . . . .	8
Failing to stop for red light . . . . .	10
Failing to slow down at intersection . . . . .	19
Faulty brakes . . . . .	1
Failing to slow down for pedestrian . . . . .	4
Failing to keep to right of road . . . . .	9
Improper use of spotlight . . . . .	1
Impeding operation . . . . .	1
Improper lights . . . . .	13
Leaving scene of accident without making self known . . . . .	32
Not duly licensed . . . . .	87
No license in possession . . . . .	31
No registration in possession . . . . .	22
No registration plates . . . . .	1
No certificate of inspection . . . . .	41
Operating while under the influence of intoxicating liquor . . . . .	154
Operating so as to endanger . . . . .	78
Operating after revocation of suspension of license . . . . .	11
Operating after revocation of registration . . . . .	2
Operating uninsured motor vehicle . . . . .	30
Operating unregistered motor vehicle . . . . .	24
Operating at a speed greater than is reasonable and proper . . . . .	37
Operating without proper registration plates . . . . .	5
Passing where view is obstructed . . . . .	1
Passing at intersection . . . . .	1
Reckless driving . . . . .	2
Refusing to show license . . . . .	2
Unnecessary noise . . . . .	1
Using Motor vehicle without authority . . . . .	17
Using without authority after suspension of license . . . . .	2
Using temporary plates without a permit . . . . .	1
Violation of aircraft regulations . . . . .	1

*Offences against the M. D. C. Rules and Regulations*

Violation of M.D.C. Rules, General . . . . .	114
Violation of M.D.C. Rules, Auto . . . . .	174
Violation of M.D.C. Rules, Speeding . . . . .	526

*Superior Court Dispositions*

Fined . . . . .	22
House of Correction, suspended . . . . .	7
Filed . . . . .	21
Probation . . . . .	2
House of Correction, committed . . . . .	6
State Prison, committed . . . . .	1
Discharged . . . . .	25
Nol Prossed . . . . .	17
Pending . . . . .	16
No bill . . . . .	4

*Lower Court Dispositions*

Appealed . . . . .	107
Committed to Jail or House of Correction . . . . .	65
Committed to State Farm . . . . .	18
Committed to Shirley School . . . . .	1
Committed to Lyman School . . . . .	1
Committed to Psychopathic Hospital . . . . .	3
Committed to Boston State Hospital . . . . .	1
Committed to Sherborn Reformatory . . . . .	2
Continued for disposition . . . . .	1
Cases pending . . . . .	45
Concord Reformatory, suspended . . . . .	2
Dismissed . . . . .	52
Defaulted . . . . .	18
Default removed . . . . .	8
Drunks released . . . . .	200
Discharged . . . . .	74
Filed . . . . .	547
Fined . . . . .	861
Filed, cost of court . . . . .	100
Fine, suspended . . . . .	19
Jail or House of Correction, suspended . . . . .	43
Held for Grand Jury . . . . .	8
No probable cause . . . . .	11
Probation . . . . .	69
Suspicious persons released . . . . .	7
Shirley School, suspended . . . . .	4
State Farm, suspended . . . . .	1
Turned over to other departments . . . . .	41

*Fines Assessed by the Courts*

M.D.C. Rules, General . . . . .	\$243.00
M.D.C. Rules, Motor Vehicle . . . . .	4,972.00
Motor Vehicle Law, Public Statute . . . . .	10,678.00
General Laws . . . . .	1,372.00
Drunks . . . . .	675.00
Total . . . . .	<u>\$17,940.00</u>

# APPENDIX No. 4

## CONTRACTS MADE AND PENDING DURING

1 Num- ber of Con- tract	2  WORK	3 Num- ber of Bids	AMOUNT OF BID		6  Contractor
			4 Next to Lowest	5 Lowest	
114 <sup>1</sup>	Furnishing and laying water pipes in Everett and Chelsea.	9	\$217,689.75 <sup>2</sup>	\$198,276.50	V. J. Grande Company, Boston.
120 <sup>1</sup>	Constructing water pipe tunnel at Malden River, Medford and Everett.	8	110,325.00	108,125.00 <sup>2</sup>	V. Barletta Co., Boston.
121 <sup>1</sup>	Furnishing and laying water pipes in Medford and Everett.	9	136,021.25	125,515.00 <sup>2</sup>	V. Barletta Co., Boston.
124 <sup>1</sup>	Furnishing water valves.	2	21,202.00 (2% discount 15 days)	20,452.00 <sup>2</sup>	Cambridge Machine & Valve, Inc., Cambridge, Mass.
125 <sup>1</sup>	Furnishing cast-iron water pipes and special castings.	3	18,379.00	18,026.00 <sup>2</sup>	Warren Foundry & Pipe Corp., Boston.
126 <sup>1</sup>	Laying water pipes in Arlington.	20	\$4,425.25	3,572.50 <sup>2</sup>	Crowley & Downey, Quincy, Mass.
127 <sup>1</sup>	Furnishing three direct feed ammoniators.	2	1,866.00	1,680.00 <sup>2</sup>	Hayes Pump & Machinery Co., Boston.
128*	Furnishing and laying water pipes in Dorchester District of Boston.	11	198,645.00	187,617.50 <sup>2</sup>	M. De Matteo Construction Co., Boston.
35-M <sup>1</sup>	Sale and purchase of electric energy to be developed at Wachusett Dam in Clinton.	- 3	- 3	- 3	New England Power Co. and <sup>4</sup> The Edison Electric Illuminating Company of Boston.
36-M <sup>1</sup>	Sale and purchase of electric energy to be developed at Sudbury Dam in Southborough.	- 3	- 3	- 3	<sup>4</sup> The Edison Electric Illuminating Company of Boston.
77-M <sup>1</sup>	Repairing roofs of buildings at Glenwood Pipe Yard in Medford.	2	\$2,284.00	\$1,267.00 <sup>2</sup>	Atlantic Roofing and Skylight Works, Boston.



## THE YEAR 1938 — WATER DIVISION

7	8	9	10
Date of Contract	Date of Completion of Contract	Prices of Principal Items of Contract	Value of Work done Dec. 31, 1938
Oct. 14, 1936	June 16, 1938	See Annual Report for 1936.	\$287,849.18
Aug. 24, 1937	June 25, 1938	See Annual Report for 1937.	103,952.00
Aug. 24, 1937	Aug. 23, 1938	See Annual Report for 1937.	144,396.70
Nov. 22, 1937	Aug. 29, 1938	See Annual Report for 1937.	20,452.00
May 23, 1938	Aug. 30, 1938	For all 6-inch, Class B, and 12-inch, Class B, C and D, pit cast cement-lined bell and spigot water pipe, \$57.10 per ton of 2,000 lbs., and 20-inch, Class B and C, \$57 per ton of 2,000 lbs.; and for all 4-inch to 36-inch tar-coated bell and spigot special castings, \$116 per ton of 2,000 lbs.	19,625.02
July 25, 1938	Dec. 21, 1938	For laying 20-inch cement-lined cast-iron pipes, \$0.85 per lin. ft.; 12-inch, \$0.80 per lin. ft.; 6-inch cast-iron pipe for blow-offs, \$0.80 per lin. ft.; for rock excavation above grade, \$3 per cu. yd.; for earth excavation below grade, \$0.40 per cu. yd.; for valve chambers, \$60 per chamber; for concrete masonry for foundations for chambers and backing for curves, \$8 per cu. yd.; for bituminous Macadam pavement, \$1.75 per sq. yd.	5,680.74
July 5, 1938	Oct. 11, 1938	For one manual control direct feed ammoniator with maximum capacity of 100 lbs. of ammonia per day, \$540; for two manual control direct feed ammoniators adaptable to either 35 or 100 lbs. maximum capacity of ammonia per day, \$1,140.	1,680.00
Oct. 18, 1938	-	For furnishing and laying 36-inch electric-welded steel pipe, \$13 per lin. ft.; for laying 36-inch, 30-inch and 20-inch cast-iron pipe, furnished by the Commonwealth, for connections, \$3 per lin. ft.; for laying 12-inch and 6-inch cast-iron pipe, furnished by the Commonwealth, for blow-offs and air vents, \$2 per lin. ft.; for rock excavation above and below grade, \$4.25 per cu. yd.; for earth excavation below grade, \$1 per cu. yd.; for chambers for 36-inch and 30-inch gate valves, \$150 per chamber; for chambers for blow-off, by-pass and connection valves, \$90 per chamber; for chambers for air valves and manholes, \$50 per chamber; for concrete masonry for foundations for valve chambers and anchorages for pipes, \$7 per cu. yd.; for bituminous Macadam pavement, \$0.80 per sq. yd.; for sheet asphalt pavement, \$2.25 per sq. yd.; for granolithic sidewalks, \$1.75 per sq. yd.; for removing existing 36-inch cast-iron pipe, \$3 per lin. ft.; for additional work at railroad crossing, \$2,500.	31,532.38
Mar. 1, 1929	<sup>6</sup> Nov. 30, 1938	Sale and purchase of all electricity generated after deduction of that used by Commission in connection with the operation of its work in Wachusett Section.	\$493,965.74
Mar. 1, 1929	<sup>6</sup> Nov. 30, 1938	Sale and purchase of all electricity generated after deduction of that used by Commission in connection with operation of its Sudbury Power Station.	288,235.49
Nov. 22, 1937	May 16, 1938	See Annual Report for 1937.	\$1,267.00

## CONTRACTS MADE AND PENDING DURING

1 Num- ber of Con- tract	2  WORK	3 Num- ber of Bids	AMOUNT OF BID		6  Contractor
			4 Next to Lowest	5 Lowest	
78-M <sup>1</sup>	Replacing stiff-leg derrick at Chestnut Hill Pipe Yard in Boston.	4	\$3,775.00	\$2,525.00 <sup>2</sup>	Groisser & Shlager Iron Works, Somerville, Mass.
79-M <sup>1</sup>	Repairing girder of pipe bridge over Fitchburg Division of Boston & Maine Railroad in North Cambridge.	6 <sup>7</sup>	1,800.00	1,775.00 <sup>8</sup>	West End Iron Works, Cambridge, Mass.
80-M <sup>1</sup>	Retubing vertical fire tube boiler No. 24 at Spot Pond Pumping Station in Stoneham.	4	1,785.00	1,750.00 <sup>2</sup>	The Hodge Boiler Works, Boston.
81-M <sup>1</sup>	Furnishing centrifugal steam-turbine-driven pumping units at Chestnut Hill Pumping Stations in Boston.	5	3,098.00	2,310.00 <sup>2</sup>	Lawrence Machine & Pump Corp., Lawrence, Mass.
82-M	Furnishing and attaching brass wire netting to the pipe rail fence on the Promenade of the Wachusett Dam in Clinton.	3	6,956.00	4,865.00 <sup>2</sup>	Oliver Whyte Com- pany, Medford, Mass.
83-M	Repairing timber bulkhead at Chelsea Creek in Chelsea.	5	3,463.75	2,947.50 <sup>2</sup>	M. & R. Construction Company, Boston.
84-M	Furnishing fuel economizers at Chestnut Hill Pumping Stations Nos. 1 and 2 in Boston.	1	—	8,060.00 <sup>2</sup>	The Green Fuel Econo- mizer Co., Inc., Bos- ton.
85-M	Repairs to North Dike Riprap of the Wachusett Reservoir in Clinton and Sterling, Dam- age caused by Hurricane of Sept. 21, 1938.	4 <sup>7</sup>	11,760.00	9,450.00 <sup>9</sup>	R. H. Newell Co., Uxbridge, Mass.
86-M	Sale and purchase of electric energy to be developed at the Wachusett Dam in Clinton.	— <sup>3</sup>	— <sup>3</sup>	— <sup>3</sup>	New England Power Company and Boston Edison Company.
87-M	Sale and purchase of electric energy to be developed at Sudbury Dam in South- borough.	— <sup>3</sup>	— <sup>3</sup>	— <sup>3</sup>	Boston Edison Com- pany

\*P.W.A. Docket No. Mass. 1516-F, Mass. State Project No. D-203.

<sup>1</sup> Contract completed.

<sup>2</sup> Contract based upon this bid.

<sup>3</sup> Competitive bids were not received.

<sup>4</sup> Name changed to Boston Edison Company, July 15, 1937.

<sup>5</sup> Terminated; superseded by Contract No. 86-M.

<sup>6</sup> Terminated; superseded by Contract No. 87-M.

<sup>7</sup> Includes two alternative bids.

<sup>8</sup> Contract based upon this alternative bid for replacing the girder.

<sup>9</sup> Contract based upon this alternative bid.

THE YEAR 1938 — Water Division — Concluded

7	8	9	10
Date of Contract	Date of Completion of Contract	Prices of Principal Items of Contract	Value of Work done Dec. 31, 1938
Nov. 30, 1937	June 3, 1938	See Annual Report for 1937.	\$2,525.00
Nov. 30, 1937	Jan. 11, 1938	See Annual Report for 1937.	1,775.00
Dec. 31, 1937	Feb. 8, 1938	See Annual Report for 1937.	1,750.00
Feb. 21, 1938	June 3, 1938	For furnishing six centrifugal Coppus steam-turbine-driven pumping units for forcing circulation in the water legs of six vertical fire tube boilers at the Chestnut Hill Pumping Stations, \$2,310.	2,310.00
Nov. 16, 1938	-	For furnishing and attaching brass wire netting, lump sum \$4,865.	-
Nov. 29, 1938	-	For furnishing and driving piles, \$1.40 per lin. ft.; for furnishing and placing timber, \$125 per M ft. board measure; for furnishing and placing gravel fill, \$1 per cu. yd.; for additional work of removing a portion of existing bulkhead, \$65.	-
Nov. 29, 1938	-	For furnishing one fuel economizer and appurtenances and disposing of the existing fuel economizer at Chestnut Hill Pumping Station No. 1, \$4,281, and at Chestnut Hill Pumping Station No. 2, \$3,779.	-
Nov. 22, 1938	-	For quarrying rock and placing it in the form of riprap, \$4.50 per cu. yd.	-
Dec. 1, 1938	-	Sale and purchase of all electricity generated at the Wachusett Power Station with the exception of that used in connection with the operation of the Commission's Works in Wachusett Section and that supplied by the Commission to the Metropolitan District Water Supply Commission or its contractors.	\$1,507.04
Dec. 1, 1938	-	Sale and purchase of all electricity generated that is not used in connection with the operation of the Power Plant or supplied by the Commission to the Metropolitan District Water Supply Commission or its contractors.	2,619.65



# APPENDIX No. 5

TABLE No. 1.—*Monthly Rainfall in inches at Various Places on the Metropolitan Water Works, 1938*

	January	February	March	April	May	June	July	August	September	October	November	December	Totals
Wachusett Watershed													
Princeton	5.45	2.74	2.66	3.07	3.52	7.29	10.75	2.91	11.33	2.44	3.31	3.07	58.54
Jefferson	5.10	2.79	3.22	3.36	3.86	8.01	8.13	4.86	12.54	2.33	4.20	3.64	62.04
Sterling	4.38	2.23	2.77	3.47	3.59	7.53	8.62	2.45	10.68	2.76	3.51	3.45	55.44
Boylston	4.75	2.62	2.86	3.50	3.82	6.81	10.37	2.83	9.80	2.23	3.42	3.31	56.32
Sudbury Watershed													
Sudbury Dam	4.83	2.44	2.67	3.05	3.89	7.28	9.77	3.73	9.37	1.87	3.14	3.68	55.72
Framingham	4.91	2.31	2.87	3.03	4.44	7.45	11.80	4.93	10.12	1.95	3.09	3.50	60.40
Ashland Dam	4.54	2.32	2.68	3.08	4.38	7.73	13.05	4.16	8.64	1.99	2.95	3.44	58.96
Cordaville	4.59	2.44	2.71	3.12	4.26	8.08	10.61	4.91	8.98	1.95	2.99	3.89	58.53
Lake Cochituate	5.22	2.55	2.71	3.20	4.58	6.85	13.91	5.25	8.58	2.15	2.77	3.46	61.23
Chestnut Hill Reservoir	4.13	2.42	2.46	3.20	4.63	7.27	9.73	3.99	6.81	2.83	3.83	2.85	52.78
Spot Pond	4.80	2.88	2.76	3.25	4.34	5.88	10.44	2.22	7.30	2.87	3.29	3.22	53.25
Average of All	4.79	2.52	2.76	3.18	4.12	7.29	10.65	3.84	9.47	2.31	3.23	3.41	57.57
Average, Wachusett Watershed	4.92	2.59	2.88	3.35	3.70	7.41	9.47	3.26	11.09	2.44	3.61	3.37	58.09
Average, Sudbury Watershed	4.72	2.38	2.73	3.07	4.24	7.63	11.31	4.43	9.28	1.94	3.04	3.63	58.40

TABLE NO. 2.—*Rainfall in Inches at Chestnut Hill Reservoir — 1938*

DATE	AMOUNT	DURATION	DATE	AMOUNT	DURATION
Jan. 1 . . .	0.95 <sup>2</sup>	7.00 A.M. to	Apr. 2 . . .	0.03	6.00 P.M. to 9.30 P.M.
Jan. 2 . . .		9.10 A.M.	Apr. 8 . . .	1.36 <sup>2</sup>	3.00 P.M. to
Jan. 7 . . .	0.50	1.15 A.M. to 10.30 A.M.	Apr. 9 . . .		11.15 P.M.
Jan. 12 . . .	0.57 <sup>1</sup>	9.45 P.M. to	Apr. 14 . . .	0.01	1.15 A.M. to 2.30 A.M.
Jan. 13 . . .		11.10 A.M.	Apr. 15 . . .	0.35	3.00 P.M. to 11.15 P.M.
Jan. 16 . . .	0.43 <sup>1</sup>	10.00 P.M. to	Apr. 18 . . .	0.01	1.00 A.M. to 4.50 A.M.
Jan. 17 . . .		8.00 P.M.	Apr. 18 . . .	0.63	7.05 A.M. to 11.00 P.M.
Jan. 21 . . .	0.18 <sup>1</sup>	8.00 P.M. to	Apr. 22 . . .	0.06	10.20 A.M. to 12.10 P.M.
Jan. 22 . . .		3.20 A.M.	Apr. 29 . . .	0.19	5.00 P.M. to
Jan. 22 . . .	0.15 <sup>1</sup>	3.00 P.M. to	Apr. 30 . . .		12.45 A.M.
Jan. 23 . . .		4.30 A.M.	Apr. 30 . . .	0.19	8.00 P.M. to 10.30 P.M.
Jan. 24 . . .	1.19	11.15 P.M. to	Total . . .	2.83	
Jan. 25 . . .		2.10 P.M.			
Jan. 31 . . .	0.16 <sup>2</sup>	8.45 A.M. to 4.30 P.M.	May 6 . . .	0.09	9.30 A.M. to 6.00 P.M.
Total . . .	4.13		May 10 . . .	0.13	2.10 P.M. to 7.00 P.M.
Feb. 3 . . .	0.60	1.30 P.M. to 9.30 P.M.	May 12 . . .	0.68	10.00 A.M. to 5.50 P.M.
Feb. 6 . . .	0.34	10.35 P.M. to	May 14 . . .	1.73	8.30 P.M. to
Feb. 7 . . .		2.50 A.M.	May 15 . . .		8.50 A.M.
Feb. 9 . . .	0.06	11.05 A.M. to 11.15 P.M.	May 15 . . .	0.22	3.45 P.M. to 11.20 P.M.
Feb. 13 . . .		8.20 A.M. to	May 19 . . .	0.03	11.30 P.M. to
Feb. 14 . . .	0.28	9.20 A.M.	May 20 . . .		3.30 A.M.
Feb. 17 . . .		8.45 P.M. to	May 20 . . .	0.02	12.35 P.M. to 2.30 P.M.
Feb. 18 . . .	0.09	3.40 A.M.	May 22 . . .	0.28	6.00 A.M. to 10.30 A.M.
Feb. 18 . . .		11.15 P.M. to	May 24 . . .	0.01	5.15 A.M. to 6.00 A.M.
Feb. 19 . . .	0.04	4.20 A.M.	May 24 . . .	0.17	7.30 P.M. to 11.40 P.M.
Feb. 20 . . .		3.30 P.M. to 3.30 P.M.	May 26 . . .	1.19	3.10 P.M. to
Feb. 22 . . .	0.59 <sup>1</sup>	7.30 P.M. to	May 27 . . .		7.20 A.M.
Feb. 22 . . .	0.08 <sup>1</sup>	2.30 A.M.	May 27 . . .	0.07	10.45 A.M. to 4.45 P.M.
Feb. 23 . . .		3.30 P.M. to 11.00 P.M.	May 29 . . .	0.01	1.30 A.M. to 3.10 A.M.
Feb. 23 . . .	0.02	8.20 A.M.	Total . . .	4.63	
Feb. 24 . . .		1.00 P.M. to			
Feb. 25 . . .	0.18 <sup>2</sup>	8.00 P.M.	June 3 . . .	0.01	8.30 A.M. to 10.10 A.M.
Feb. 27 . . .			June 4 . . .	0.61	3.00 P.M. to
Feb. 28 . . .	0.14 <sup>2</sup>		June 5 . . .		12.45 A.M.
Total . . .			June 8 . . .	0.02	9.10 A.M. to 11.30 A.M.
Mar. 5 . . .	0.45 <sup>2</sup>	4.30 A.M. to	June 11 . . .	0.63	8.45 A.M. to
Mar. 6 . . .		6.30 A.M.	June 12 . . .		3.15 A.M.
Mar. 12 . . .	0.10	12.20 A.M. to	June 12 . . .	1.24	5.30 P.M. to
Mar. 13 . . .		6.00 A.M.	June 13 . . .		9.10 A.M.
Mar. 16 . . .	1.27	3.30 P.M. to	June 16 . . .	0.03	8.30 P.M. to 10.45 P.M.
Mar. 17 . . .		7.10 A.M.	June 19 . . .	0.55	2.15 P.M. to 6.45 P.M.
Mar. 20 . . .	0.02	12.00 N'N to 7.00 P.M.	June 26 . . .	4.18	8.05 A.M. to
Mar. 24 . . .	0.01	6.10 A.M. to 7.00 A.M.	June 29 . . .		2.30 A.M.
Mar. 26 . . .	0.46	1.00 P.M. to 8.00 P.M.	Total . . .	7.27	
Mar. 30 . . .	0.15	7.10 P.M. to			
Apr. 1 . . .		3.45 A.M.			
Total . . .	2.46				

<sup>1</sup> Snow.  
<sup>2</sup> Rain and Snow.

TABLE NO. 2.—*Rainfall in Inches at Chestnut Hill Reservoir — 1938*

DATE	AMOUNT	DURATION	DATE	AMOUNT	DURATION
July 1 . . .	0.30	7.45 P.M. to	Oct. 14 . . .	0.04	7.10 A.M. to 11.45 A.M.
July 2 . . .		7.10 A.M.	Oct. 20 . . .	0.19	7.00 P.M. to
July 4 . . .	0.03	5.30 P.M. to 8.10 P.M.	Oct. 21 . . .		2.20 A.M.
July 5 . . .	0.10	3.05 P.M. to	Oct. 24 . . .	2.03	5.00 A.M. to 11.30 P.M.
July 6 . . .		6.45 A.M.	Oct. 27 . . .	0.32	8.20 P.M. to
July 10 . . .	0.14	1.00 A.M. to 3.45 A.M.	Oct. 28 . . .		3.00 A.M.
July 11 . . .	0.57	5.25 P.M. to	Oct. 28 . . .	0.22	5.30 P.M. to
July 12 . . .		11.30 P.M.	Oct. 29 . . .		12.45 A.M.
July 14 . . .	0.12	9.20 A.M. to 9.15 P.M.	Oct. 30 . . .	0.01	12.30 A.M. to 1.00 A.M.
July 18 . . .	1.65	9.20 A.M. to	Oct. 30 . . .	0.02	11.30 P.M. to
July 19 . . .		11.25 P.M.	Oct. 31 . . .		12.45 A.M.
July 20 . . .	0.93	8.10 A.M. to			
July 21 . . .		8.30 A.M.	Total . . .	2.83	
July 21 . . .	5.77	2.30 P.M. to			
July 24 . . .		3.00 P.M.	Nov. 6 . . .	0.01	12.30 P.M. to 8.15 P.M.
July 27 . . .	0.02	9.00 P.M. to 10.00 P.M.	Nov. 8 . . .	0.14	8.35 A.M. to
July 29 . . .	0.02	12.00 MID. to 12.45 A.M.	Nov. 9 . . .		2.45 A.M.
July 29 . . .	0.08	6.45 P.M. to 9.10 P.M.	Nov. 13 . . .	0.11	6.10 P.M. to 7.45 P.M.
Total . . .	9.73		Nov. 17 . . .	0.19	5.10 A.M. to 2.30 P.M.
			Nov. 18 . . .	0.01	4.30 P.M. to 5.10 P.M.
Aug. 1 . . .	0.06	9.55 P.M. to	Nov. 19 . . .	1.30	10.05 A.M. to
Aug. 2 . . .		4.20 A.M.	Nov. 20 . . .		1.15 A.M.
Aug. 6 . . .	0.11	3.55 P.M. to 10.00 P.M.	Nov. 23 . . .	0.15	5.20 P.M. to
Aug. 8 . . .	0.51	8.30 P.M. to 10.45 P.M.	Nov. 24 . . .		5.45 A.M.
Aug. 9 . . .	0.02	6.10 P.M. to 7.00 P.M.	Nov. 24 . . .	0.28 <sup>1</sup>	4.45 P.M. to
Aug. 11 . . .	0.43	1.00 A.M. to 5.00 P.M.	Nov. 25 . . .		11.00 A.M.
Aug. 16 . . .	2.13	11.45 P.M. to	Nov. 27 . . .	0.64 <sup>1</sup>	1.15 A.M. to 1.45 P.M.
Aug. 17 . . .		3.20 A.M.	Total . . .	2.83	
Aug. 18 . . .	0.07	9.45 P.M. to			
Aug. 19 . . .		1.45 A.M.	Dec. 4 . . .	0.13	2.15 A.M. to 6.30 A.M.
Aug. 24 . . .	0.09	12.45 A.M. to 5.55 A.M.	Dec. 5 . . .	1.33	11.15 A.M. to
Aug. 27 . . .	0.50	7.10 P.M. to 8.40 P.M.	Dec. 6 . . .		12.30 P.M.
Aug. 30 . . .	0.05	7.45 P.M. to 10.40 P.M.	Dec. 8 . . .	0.68	4.25 P.M. to
Sept. 1 . . .	0.02	5.25 A.M. to 6.45 A.M.	Dec. 9 . . .		11.20 P.M.
Total . . .	3.99		Dec. 10 . . .	0.16	3.15 A.M. to 4.30 P.M.
			Dec. 11 . . .	0.01	12.30 P.M. to 2.00 P.M.
Sept. 7 . . .	0.23	12.30 P.M. to 11.15 P.M.	Dec. 18 . . .	0.05 <sup>2</sup>	3.30 P.M. to
Sept. 12 . . .	1.12	8.30 P.M. to	Dec. 19 . . .		5.30 A.M.
Sept. 13 . . .		11.10 P.M.	Dec. 19 . . .	0.02 <sup>2</sup>	10.05 A.M. to 8.30 P.M.
Sept. 15 . . .	0.44	4.00 A.M. to 1.20 P.M.	Dec. 23 . . .	Trace	11.15 P.M. to
Sept. 17 . . .	3.16	8.00 P.M. to	Dec. 24 . . .		1.30 A.M.
Sept. 19 . . .		11.30 P.M.	Dec. 24 . . .	0.05 <sup>1</sup>	7.20 A.M. to
Sept. 20 . . .	1.37	7.10 A.M. to	Dec. 25 . . .		2.00 A.M.
Sept. 21 . . .		10.40 P.M.	Dec. 27 . . .	0.34 <sup>2</sup>	1.05 A.M. to 11.10 A.M.
Sept. 23 . . .	0.01	5.45 A.M. to 6.50 A.M.	Dec. 29 . . .	0.01 <sup>2</sup>	10.35 P.M. to
Sept. 27 . . .	0.23	4.30 P.M. to 8.00 P.M.	Dec. 30 . . .		1.00 A.M.
Sept. 30 . . .	0.25	7.10 A.M. to	Dec. 31 . . .	0.07 <sup>1</sup>	12.15 P.M. to 11.55 P.M.
Oct. 1 . . .		1.45 A.M.	Total . . .	2.85	
Total . . .	6.81				

<sup>1</sup> Snow.

<sup>2</sup> Rain and Snow.

Total for the year, 52.78.



TABLE No. 3. — *Wachusett System — Statistics of Flow of Water, Storage and Rainfall in 1938*  
(Watershed above dam = 107.69 square miles)

MONTH	GALLONS PER DAY										Rainfall Col- lected (Inches)	Percent- age of Rainfall Col- lected		
	Taken by Town of Clinton	Taken by City of Wor- cester	Received from Ware River Watershed	Received <sup>2</sup> from City of Worcester Watershed	Discharged <sup>3</sup> into Wachusett Aqueduct	Wasted into River below Dam	Seepage <sup>4</sup> through the North Dike	STORAGE <sup>5</sup>		Total Yield of Water- shed			Yield per Square Mile	
								Gain	Loss					
January .	—	—	—	21,377,000	139,377,000	20,552,000	1,000,000	74,029,000	—	213,581,000	1,983,000	4.92	3.538	71.9
February .	—	—	—	18,193,000	157,457,000	102,750,000	1,000,000	—	14,943,000	228,071,000	2,118,000	2.59	3.412	131.5
March .	—	—	—	11,219,000	121,287,000	41,277,000	1,000,000	33,155,000	—	185,500,000	1,723,000	2.88	3.073	106.8
April .	—	—	—	9,907,000	116,010,000	37,567,000	1,000,000	22,203,000	—	166,873,000	1,550,000	3.35	2.675	79.9
May .	—	—	—	6,587,000	94,135,000	30,061,000	1,000,000	4,397,000	—	123,006,000	1,142,000	3.70	2.038	55.1
June .	—	—	—	6,853,000	116,683,000	32,470,000	1,000,000	3,180,000	—	146,480,000	1,360,000	7.41	2.348	31.7
July .	—	—	—	22,777,000	113,642,000	161,371,000	1,000,000	10,135,000	—	263,371,000	2,446,000	9.47	4.363	46.1
August .	—	—	—	7,100,000	120,284,000	29,081,000	1,000,000	—	50,026,000	93,239,000	866,000	3.26	1.545	47.3
September .	—	—	—	29,200,000	107,387,000	302,347,000	1,000,000	—	15,774,000	365,760,000	3,396,000	11.09	5.863	52.9
October .	—	—	—	11,451,000	101,719,000	105,761,000	1,000,000	—	81,229,000	115,800,000	1,075,000	2.44	1.918	78.6
November .	—	—	—	7,473,000	95,803,000	23,327,000	1,000,000	—	1,330,000	111,327,000	1,034,000	3.61	1.785	49.4
December	—	—	—	19,423,000	80,000,000	240,097,000	1,000,000	—	35,887,000	265,787,000	2,468,000	3.37	4.403	130.7
Total .												58.09	36.961	63.6
Av. for Yr.	—	—	—	14,275,000	113,340,000	93,760,000	1,000,000	12,424,000	16,748,000	189,501,000	1,760,000			

<sup>1</sup> For water supply of Clinton and Lancaster.  
<sup>2</sup> Received from City of Worcester Watershed, not included in Wachusett watershed yield.  
<sup>3</sup> Including 258,000 gallons per day drawn from aqueduct for supply of Westborough State Hospital.  
<sup>4</sup> Estimated.  
<sup>5</sup> Aggregate storage in Wachusett Reservoir and in ponds and mill reservoirs.

TABLE No. 4. — *Sudbury System — Statistics of Flow of Water, Storage and Rainfall in 1938*

(Watershed = 75.2 square miles)

MONTH	GALLONS PER DAY										Rain-fall Col-lected (In-ches)	Rain-fall Col-lected (In-ches)	Percent- age of Rainfall Col- lected	
	Water* received from Wachusett Reservoir	Water discharged through Sudbury Aqueduct	Water discharged through Weston Aqueduct	Water used by Fram- ingham Water Works	Water diverted from Water- shed by Sewers, etc.	Water wasted from Farm Pond	Water wasted into River below Lowest Dam	STORAGE		Total Yield of Watershed				Yield per Square Mile
								Gain	Loss					
January .	139,132,000	16,397,000	107,884,000	1,410,000	1,055,000	1,474,000	140,193,000	8,990,000	—	138,271,000	1,839,000	4.72	69.5	
February .	157,210,000	15,896,000 <sup>1</sup>	110,050,000	1,400,000	896,000	350,000	160,025,000	—	4,439,000	126,968,000	1,688,000	2.38	114.5	
March .	121,035,000	13,748,000 <sup>2</sup>	110,539,000	1,355,000	948,000	—	103,619,000	—	2,477,000	106,697,000	1,419,000	2.73	92.6	
April .	115,760,000	10,517,000	111,077,000	1,253,000	866,000	—	44,647,000	36,113,000	—	88,713,000	1,180,000	3.07	66.3	
May .	93,887,000	11,055,000	106,442,000	1,264,000	590,000	—	46,681,000	—	2,077,000	70,068,000	932,000	4.24	39.2	
June .	116,424,000	16,160,000	107,590,000	1,397,000	787,000	123,000	79,170,000	9,920,000	—	98,723,000	1,313,000	7.63	29.7	
July .	113,384,000	16,419,000	109,103,000	1,371,000	1,645,000	1,026,000	249,768,000	—	6,716,000	259,232,000	3,447,000	11.31	54.4	
August .	120,000,000	23,323,000	117,478,000	1,419,000	719,000	1,084,000	72,116,000	—	10,074,000	86,065,000	1,144,000	4.43	46.1	
September .	107,107,000	17,503,000	108,843,000	1,347,000	1,400,000	220,000	130,740,000	18,244,000	—	171,190,000	2,276,000	9.28	42.3	
October .	101,448,000	19,194,000	112,177,000	1,342,000	858,000	861,000	54,977,000	—	16,003,000	71,958,000	957,000	1.94	88.0	
November .	95,550,000	15,190,000	114,307,000	1,313,000	420,000	—	43,013,000	—	12,066,000	66,627,000	886,000	3.04	50.3	
December .	79,755,000	20,532,000	111,045,000	1,410,000	1,439,000	203,000	111,426,000	—	20,013,000	146,287,000	1,945,000	3.63	95.6	
Total .												58.40	57.1	
Av. for Yr.	113,082,000	16,348,000	110,550,000	1,356,000	970,000	450,000	102,877,000	6,046,000	6,204,000	119,311,000	1,587,000			

\*Not including 258,000 gallons per day drawn from Wachusett Aqueduct for the supply of the Westborough State Hospital, not discharged into Sudbury Reservoir.

<sup>1</sup> Includes 96,000 gallons per day to Lake Cochituate.

<sup>2</sup> Includes 245,000 gallons per day wasted cleaning aqueduct.

TABLE No. 5.— *Cochituate System — Statistics of Flow of Water, Storage and Rainfall in 1938*  
(Watershed of Lake = 17.40 square miles)

MONTH	GALLONS PER DAY						Rainfall Collected (Inches)	Percent- age of Rainfall		
	Water received from Sudbury Aqueduct	Water diverted from Water- shed by Sewers, etc.	Water wasted at Outlet of Lake	STORAGE		Total Yield of Water- shed			Yield per Square Mile	
				Gain	Loss					
January . . . . .	—	1,603,000	28,874,000	3,907,000	—	34,384,000	1,976,000	5.22	3.525	67.5
February . . . . .	96,000	1,732,000	30,393,000	—	3,575,000	28,454,000	1,635,000	2.55	2.634	103.3
March . . . . .	—	1,619,000	18,468,000	4,919,000	—	25,006,000	1,437,000	2.71	2.564	94.6
April . . . . .	—	1,557,000	22,263,000	—	3,493,000	20,327,000	1,168,000	3.20	2.017	63.0
May . . . . .	—	1,226,000	19,403,000	—	448,000	20,181,000	1,160,000	4.58	2.069	45.2
June . . . . .	—	1,113,000	16,287,000	2,020,000	—	19,420,000	1,116,000	6.85	1.927	28.1
July . . . . .	—	2,735,000	71,078,000	852,000	—	74,665,000	4,291,000	13.91	7.654	55.0
August . . . . .	—	2,045,000	22,949,000	—	2,971,000	22,023,000	1,266,000	5.25	2.257	43.0
September . . . . .	—	1,833,000	44,817,000	—	12,037,000	34,613,000	1,989,000	8.58	3.434	40.0
October . . . . .	—	1,813,000	39,000	13,958,000	—	15,810,000	909,000	2.15	1.621	75.4
November . . . . .	—	1,403,000	16,453,000	—	2,813,000	15,043,000	865,000	2.77	1.492	53.9
December . . . . .	—	2,103,000	30,068,000	—	3,894,000	28,277,000	1,625,000	3.46	2.899	83.8
Total . . . . .								61.23	34.093	55.7
Average for Year . . . . .	7,000	1,735,000	26,747,000	2,173,000	2,403,000	28,245,000	1,623,000			



TABLE No. 6.—Sources from which and Periods during which Water has been drawn for the Supply of the Metropolitan Water District in 1938

From Wachusett Reservoir into the Wachusett Aqueduct

MONTH	Number of Days during which Water was Flowing	ACTUAL TIME		* Million Gallons Drawn
		Hours	Minutes	
January . . . . .	25	294	25	4,320.7
February . . . . .	23	298	25	4,408.8
March . . . . .	27	256	15	3,759.9
April . . . . .	25	236	05	3,480.3
May . . . . .	22	197	15	2,918.2
June . . . . .	26	236	29	3,500.5
July . . . . .	25	237	05	3,522.9
August . . . . .	27	250	31	3,728.8
September . . . . .	26	231	54	3,221.6
October . . . . .	23	220	55	3,153.3
November . . . . .	21	196	45	2,874.1
December . . . . .	17	170	25	2,480.0
Totals . . . . .	287	117.77 days		41,369.1

\*Including quantity supplied Westborough State Hospital.

From Sudbury Reservoir through the Weston Aqueduct to Weston Reservoir

MONTH	Number of Days during which Water was Flowing	ACTUAL TIME		Million Gallons Drawn
		Hours	Minutes	
January . . . . .	31	744	00	3,344.4
February . . . . .	28	672	00	3,081.4
March . . . . .	31	744	00	3,426.7
April . . . . .	30	718	10	3,332.3
May . . . . .	31	739	11	3,299.7
June . . . . .	30	705	08	3,227.7
July . . . . .	31	732	17	3,382.2
August . . . . .	31	737	00	3,641.8
September . . . . .	30	696	25	3,265.3
October . . . . .	31	740	32	3,477.5
November . . . . .	30	718	35	3,429.2
December . . . . .	31	744	00	3,442.4
Totals . . . . .	365	362.14 days		40,350.6

From Framingham Reservoir No. 3 through Sudbury Aqueduct to Chestnut Hill Reservoir

MONTH	Number of Days during which Water was Flowing	ACTUAL TIME		Million Gallons Drawn
		Hours	Minutes	
January . . . . .	31	744	0	508.3
February . . . . .	28	649	0	442.4
March . . . . .	30	696	0	418.6
April . . . . .	30	*719	0	315.5
May . . . . .	31	744	0	342.7
June . . . . .	30	720	0	484.8
July . . . . .	31	744	0	509.0
August . . . . .	31	744	0	723.0
September . . . . .	30	720	0	525.1
October . . . . .	31	*745	0	595.0
November . . . . .	30	720	0	455.7
December . . . . .	31	744	0	636.5
Totals . . . . .	364	362.04 days		5,956.6

\*Daylight Saving change.

TABLE No. 7. — *Average Daily Quantity of Water Flowing through  
Aqueducts in 1938 by Months*

MONTH					Wachusett Aqueduct into Sudbury Reservoir (Gallons)	Weston Aqueduct into Metropolitan District (Gallons)	Sudbury Aqueduct into Chestnut Hill Reservoir (Gallons)	Cochituate Aqueduct into Chestnut Hill Reservoir (Gallons)
January	.	.	.	.	139,132,000	107,884,000	16,397,000	—
February	.	.	.	.	157,210,000	110,050,000	15,800,000	—
March	.	.	.	.	121,035,000	110,539,000	13,503,000	—
April	.	.	.	.	115,760,000	111,077,000	10,517,000	—
May	.	.	.	.	93,887,000	106,442,000	11,055,000	—
June	.	.	.	.	116,424,000	107,590,000	16,160,000	—
July	.	.	.	.	113,384,000	109,103,000	16,419,000	—
August	.	.	.	.	120,000,000	117,478,000	23,323,000	—
September	.	.	.	.	107,107,000	108,843,000	17,503,000	—
October	.	.	.	.	101,448,000	112,177,000	19,194,000	—
November	.	.	.	.	95,550,000	114,307,000	15,190,000	—
December	.	.	.	.	79,755,000	111,045,000	20,532,000	—
Average	.	.	.	.	113,082,000	110,550,000	16,320,000	—

TABLE No. 8. — (Meter Basis). *Average Daily Consumption of Water by Districts in the Cities and Towns Supplied by the Metropolitan Water Works in 1938*

MONTH	Low SERVICE	SOUTHERN HIGH SERVICE	INTERMEDIATE HIGH SERVICE	NORTHERN HIGH SERVICE	SOUTHERN EXTRA HIGH SERVICE	NORTHERN EXTRA HIGH SERVICE	Total District Supplied (Gallons)	Estimated Population	Consumption per Inhabitant (Gallons)
	Portions of Arlington, Belmont, Boston, Chelsea, Everett, Malden, Medford, Somerville and Watertown (Gallons)	Quincy and Portions of Boston, Milton and Watertown (Gallons)	Portions of Belmont and Watertown (Gallons)	Melrose, Nahant, Revere, Swampscott and Winthrop and Portions of Boston, Chelsea, Everett, Malden, Medford and Somerville (Gallons)	Portions of Boston and Milton (Gallons)	Lexington and Portions of Arlington and Belmont (Gallons)			
January	70,009,600	45,707,600	1,052,200	12,509,100	1,694,900	2,070,100	133,043,500	1,461,090	91
February	68,175,000	44,477,700	1,033,500	12,298,000	1,679,500	1,822,600	129,496,300	1,461,900	89
March	64,983,800	43,383,800	1,038,400	12,299,100	1,694,600	1,774,200	125,173,900	1,462,720	86
April	61,675,600	42,730,600	1,030,300	12,285,400	1,506,800	1,840,700	121,069,400	1,463,530	83
May	61,025,600	42,824,000	1,032,300	12,457,400	1,602,700	1,917,400	120,859,400	1,464,340	83
June	65,813,000	46,535,200	1,132,200	13,341,900	1,647,600	2,251,300	130,721,200	1,465,150	89
July	67,447,500	46,706,200	1,014,600	13,527,700	1,547,100	1,903,400	132,146,500	1,465,970	90
August	71,600,700	50,178,700	1,089,900	14,226,800	1,671,200	2,054,200	140,821,500	1,466,780	96
September	66,924,000	46,522,200	1,119,400	13,632,600	1,656,500	2,052,700	131,907,400	1,467,600	90
October	67,837,300	47,015,000	1,145,300	13,055,600	1,667,300	1,920,600	132,641,100	1,468,410	90
November	66,758,200	45,838,000	1,059,300	12,632,100	1,613,300	1,846,100	129,747,000	1,469,220	88
December	70,052,000	47,164,800	1,032,000	12,530,300	1,659,600	1,801,600	134,240,300	1,470,030	91
For the Year	66,864,900	45,771,300	1,065,000	12,903,800	1,636,800	1,938,900	130,180,700	1,465,970	89



TABLE No. 9. — (Meter Basis). Average Daily Consumption of Water in Cities and Towns supplied by the Metropolitan Water Works in 1938

City or Town	ARLINGTON		BELMONT		BOSTON		CHELSEA		EVERETT		LEXINGTON		MALDEN	
Population	40,350		27,090		844,630		40,350		46,360		11,800		56,720	
MONTH	Gallons		Gallons		Gallons		Gallons		Gallons		Gallons		Gallons	
	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita
January	2,259,200	56	1,280,900	48	91,472,100	109	3,137,600	77	4,396,500	95	632,000	54	4,014,000	71
February	2,060,800	51	1,263,600	47	88,671,400	105	3,127,000	77	4,299,400	93	605,300	52	4,023,200	71
March	2,017,600	50	1,275,700	47	84,885,400	101	3,017,200	74	4,220,900	91	617,100	53	4,097,200	72
April	2,003,800	50	1,274,100	47	81,390,000	96	2,868,700	71	3,969,900	86	655,000	56	4,043,400	71
May	2,016,500	50	1,283,700	48	80,768,600	96	2,744,900	68	4,086,300	88	709,600	60	3,953,600	70
June	2,294,700	57	1,510,200	56	87,585,100	104	2,925,100	72	4,379,600	94	823,100	70	4,107,300	72
July	2,023,600	50	1,327,500	49	89,530,400	106	3,124,600	77	4,503,100	97	712,000	60	4,056,300	72
August	2,098,800	52	1,488,400	55	95,730,100	113	3,308,900	82	4,848,600	105	735,200	62	4,257,000	75
September	2,077,300	51	1,429,800	53	88,828,400	105	3,209,500	80	5,186,400	112	741,500	63	4,134,400	73
October	2,067,400	51	1,413,900	52	90,221,400	107	3,190,100	79	4,695,100	101	689,500	58	4,097,400	72
November	1,992,700	49	1,317,600	48	88,366,200	104	3,174,300	79	4,447,700	96	659,000	55	4,078,300	72
December	1,957,700	48	1,286,900	47	93,242,400	110	3,177,700	79	4,481,900	97	643,600	54	3,974,700	70
For the Year	2,072,400	51	1,346,300	50	88,391,900	105	3,083,900	76	4,460,500	96	685,500	58	4,069,900	72

TABLE No. 9. — Continued — (Meter Basis). Average Daily Consumption of Water in Cities and Towns, etc.

City or Town . . .	MEDFORD		MELROSE		MILTON		NAHANT		QUINCY		REVERE	
	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita
Population . . .	62,710		25,070		19,420		1,830		80,540		35,050	
MONTH	Gallons		Gallons		Gallons		Gallons		Gallons		Gallons	
	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita
January . . .	3,219,300	51	1,384,500	55	947,900	49	209,500	115	3,951,000	49	2,127,500	61
February . . .	3,295,900	53	1,411,400	57	999,100	52	162,400	89	3,804,000	47	2,084,900	59
March . . .	3,363,900	54	1,397,900	56	1,028,800	53	153,700	84	3,836,000	48	2,026,200	58
April . . .	3,377,000	54	1,347,600	54	1,016,100	53	148,400	81	3,813,400	47	2,095,100	60
May . . .	3,330,800	53	1,369,500	55	1,061,600	55	156,600	86	3,883,100	48	2,194,000	63
June . . .	3,472,200	55	1,503,000	60	1,057,000	55	238,400	130	4,143,000	51	2,265,900	65
July . . .	3,322,400	53	1,416,500	57	912,400	47	277,600	152	4,014,000	50	2,379,200	68
August . . .	3,411,900	54	1,522,800	61	933,400	48	295,600	162	4,321,100	54	2,529,600	72
September . . .	3,323,100	53	1,537,700	61	939,700	48	218,700	120	4,142,900	51	2,210,600	63
October . . .	3,394,800	54	1,539,200	61	989,800	51	148,600	81	4,130,800	51	2,031,000	58
November . . .	3,317,000	53	1,443,500	57	1,020,200	52	133,900	73	4,093,800	51	1,998,300	57
December . . .	3,302,700	53	1,416,700	56	1,025,600	52	110,400	60	4,001,000	49	1,981,000	57
For the Year . . .	3,344,300	53	1,440,900	57	994,100	51	188,000	103	4,012,500	50	2,161,200	62

TABLE No. 9. — Concluded — (Meter Basis).    *Average Daily Consumption of Water in Cities and Towns, etc.*

City or Town . . .	SOMERVILLE		STONEHAM		SWAMPSCOTT		WATERTOWN		WINTHROP		METROPOLITAN DISTRICT	
	Gallons		Gallons		Gallons		Gallons		Gallons		Gallons	
Population . . .	98,450		11,410		10,570		36,510		17,110		1,465,970	
MONTH	Gallons		Gallons		Gallons		Gallons		Gallons		Gallons	
	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita	Per Day	Per Capita
January . . .	9,518,700	96	663,400	59	533,500	51	2,047,400	56	1,248,500	73	133,043,500	91
February . . .	9,359,400	95	655,400	58	534,400	51	2,027,900	56	1,110,800	65	129,496,300	89
March . . .	9,072,500	92	682,900	60	549,100	52	2,046,700	56	1,085,100	63	125,173,900	86
April . . .	8,672,200	88	683,200	60	642,200	61	1,970,300	54	1,099,000	64	121,069,400	83
May . . .	8,733,700	89	683,800	60	694,600	66	2,022,100	55	1,166,400	68	120,859,400	83
June . . .	9,350,800	95	710,100	62	819,900	78	2,183,000	60	1,351,800	79	130,721,200	89
July . . .	9,390,600	95	672,300	59	826,700	78	2,056,300	56	1,601,000	94	132,146,500	90
August . . .	9,947,500	101	711,400	62	888,700	84	2,142,100	59	1,650,400	96	140,821,500	96
September . . .	8,727,700	89	715,200	63	864,300	82	2,147,200	59	1,473,000	86	131,907,400	90
October . . .	8,994,100	92	690,400	60	722,200	68	2,279,100	62	1,346,300	79	132,641,100	90
November . . .	9,027,000	92	664,800	58	660,000	62	2,167,100	59	1,185,600	69	129,747,000	88
December . . .	8,959,600	91	668,500	58	676,200	64	2,096,800	57	1,236,900	72	134,240,300	91
For the Year . . .	9,146,600	93	683,600	60	701,900	66	2,099,200	57	1,298,000	76	130,180,700	89



TABLE No. 10. — *Chemical Examinations of Water from the Wachusett Reservoir, Clinton, in 1938*  
(Parts per 1,000,000)

DATE OF COLLECTION	APPEARANCE		ODOR		RESIDUE ON EVAPORATION		AMMONIA		Hydrogen-ion Concentration	Manganese	Chlorine	Hardness
	Turbidity	Sediment	Cold	Hot	Total	Loss on Ignition	Free	Albuminoid				
Jan. 4 . . . . .	V. slight	V. slight	V. faintly vegetable	V. faintly vegetable	—	—	.010	.094	—	—	2.4	—
Jan. 18 . . . . .	V. slight	V. slight	V. faintly vegetable	Faintly vegetable	41	12	.014	.092	—	—	2.6	14
Feb. 1 . . . . .	V. slight	V. slight	V. faintly vegetable	V. faintly vegetable	—	—	.006	.034	.00	.00	2.5	—
Feb. 8 . . . . .	None	V. slight	V. faintly vegetable	V. faintly vegetable	35	14	.002	.060	.00	.00	2.4	14
Mar. 8 . . . . .	V. slight	V. slight	V. faintly vegetable	Faintly vegetable	—	—	.004	.088	.00	.00	2.5	—
Mar. 29 . . . . .	V. slight	V. slight	V. faintly vegetable	V. faintly vegetable	35	10	.002	.064	—	—	2.4	11
Apr. 5 . . . . .	V. slight	V. slight	V. faintly vegetable	Distinctly unpleasant	—	—	.002	.062	—	—	2.5	—
Apr. 20 . . . . .	Slight	V. slight	V. faintly vegetable	V. faintly vegetable	41	12	.014	.154	—	—	3.2	16
May 3 . . . . .	V. slight	V. slight	Faintly unpleasant	Faintly vegetable	—	—	.006	.136	.02	.02	2.8	—
May 17 . . . . .	V. slight	V. slight	V. faintly vegetable	Distinctly unpleasant	34	11	.068	.206	.03	.03	2.4	16
May 31 . . . . .	V. slight	V. slight	V. faintly vegetable	V. faintly vegetable	—	—	.006	.068	—	—	2.5	—
June 21 . . . . .	*	—	Faintly vegetable	Faintly vegetable	32	13	.002	.068	—	—	2.8	16
July 5 . . . . .	3	—	Faintly unpleasant	Faintly vegetable	—	—	.050	.152	—	—	3.0	—
July 19 . . . . .	2	—	Faintly unpleasant	V. faintly unpleasant	37	16	.192	.180	—	—	2.4	16
Aug. 2 . . . . .	1	—	V. faintly vegetable	Faintly vegetable	—	—	.002	.082	.02	.02	2.0	—
Aug. 16 . . . . .	3	—	Faintly vegetable	Faintly vegetable	31	11	.036	.120	.02	.02	2.4	17
Sept. 6 . . . . .	4	—	Faintly vegetable	Faintly vegetable	—	—	.014	.162	—	—	2.2	—
Sept. 20 . . . . .	2	—	V. faintly vegetable	V. faintly vegetable	41	18	.008	.072	—	—	2.2	11
Oct. 4 . . . . .	3	—	V. faintly vegetable	Faintly vegetable	—	—	.008	.080	—	—	2.2	—
Oct. 18 . . . . .	4	—	V. faintly vegetable	Faintly vegetable	39	16	.008	.120	—	—	2.2	16
Nov. 1 . . . . .	2	—	V. faintly vegetable	Faintly vegetable	—	—	.020	.138	—	—	2.5	—
Dec. 6 . . . . .	2	—	V. faintly vegetable	V. faintly vegetable	38	12	.012	.134	—	—	2.5	14
Average . . . . .					37	13	.022	.108	—	.01	2.5	15

\*Numerical Turbidity

TABLE No. 11. — Chemical Examinations of Water from the Sudbury Reservoir in 1938  
(Parts per 1,000,000)

DATE OF COLLECTION	APPEARANCE		ODOR		RESIDUE ON EVAPORATION		AMMONIA		Hydrogen-ion Concentration	Manganese	Chlorine	Hardness
	Turbidity	Sediment	Cold	Hot	Total	Loss on Ignition	Free	Albuminoid				
Jan. 4 . . .	V. slight	Slight	V. faintly vegetable	Faintly vegetable	—	—	.012	.120	—	—	3.0	—
Feb. 1 . . .	V. slight	V. slight	Faintly vegetable	Faintly vegetable	43	17	.014	.082	—	.01	2.8	14
Mar. 8 . . .	V. slight	Slight	V. faintly vegetable	V. faintly vegetable	—	—	.006	.104	—	—	3.6	—
Apr. 5 . . .	V. slight	V. slight	Faintly vegetable	Faintly unpleasant	44	14	.008	.080	—	—	3.2	16
May 10 . . .	V. slight	Slight	V. faintly vegetable	Faintly unpleasant	—	—	.012	.156	—	.00	3.2	—
May 31 . . .	V. slight	V. slight	V. faintly vegetable	V. faintly vegetable	43	13	.026	.112	—	—	3.2	11
July 5 . . .	*	—	V. faintly vegetable	Faintly vegetable	—	—	.008	.126	—	—	3.6	—
Aug. 4 . . .	2	—	V. faintly vegetable	V. faintly vegetable	45	13	.002	.160	—	.02	3.2	17
Sept. 6 . . .	4	—	V. faintly vegetable	Faintly vegetable	—	—	.040	.180	—	—	3.0	—
Oct. 4 . . .	3	—	V. faintly vegetable	V. faintly vegetable	42	16	.026	.132	—	—	2.6	20
Nov. 1 . . .	2	—	V. faintly vegetable	Faintly vegetable	—	—	.006	.118	—	—	3.2	—
Dec. 6 . . .	2	—	V. faintly vegetable	Faintly vegetable	46	19	.018	.134	—	—	2.8	10
Average . . .	.....	.....	.....	.....	44	15	.015	.125	—	.01	3.1	15

\*Numerical Turbidity.

TABLE No. 12. — Chemical Examinations of Water from Spot Pond, Stoneham, in 1938  
(Parts per 1,000,000)

DATE OF COLLECTION	APPEARANCE		ODOR		RESIDUE ON EVAPORATION		AMMONIA		Hydrogen-ion Concentration	Manganese	Chlorine	Hardness
	Turbidity	Sediment	Cold	Hot	Total	Loss on Ignition	Free	Albuminoid				
Jan. 3 . . .	V. slight	V. slight	V. faintly vegetable	V. faintly vegetable	—	—	.030	.094	—	—	4.0	—
Jan. 31 . . .	V. slight	V. slight	V. faintly vegetable	Faintly vegetable	41	15	.042	.046	—	—	4.0	16
Mar. 7 . . .	V. slight	V. slight	V. faintly vegetable	Faintly vegetable	—	—	.016	.086	—	—	4.4	—
Apr. 4 . . .	V. slight	V. slight	V. faintly vegetable	V. faintly vegetable	34	13	.010	.074	—	—	4.0	18
May 9 . . .	V. slight	V. slight	V. faintly vegetable	Faintly fishy	—	—	.002	.094	—	.01	—	—
June 6 . . .	None	—	V. faintly vegetable	Faintly vegetable	40	13	.006	.088	—	—	3.6	14
July 5 . . .	2	—	Faintly vegetable	Faintly vegetable	—	—	.010	.070	—	—	4.2	—
Aug. 8 . . .	2	—	Faintly vegetable	Distinctly vegetable	39	11	.044	.188	—	.05	3.8	20
Sept. 6 . . .	4	—	V. faintly vegetable	Distinctly fishy	—	—	.046	.412	—	—	3.8	—
Oct. 3 . . .	2	—	V. faintly vegetable	V. faintly vegetable	34	11	.020	.096	—	—	4.0	18
Oct. 31 . . .	5	—	V. faintly vegetable	Distinctly vegetable	—	—	.152	.182	—	—	4.0	—
Dec. 5 . . .	2	—	V. faintly vegetable	V. faintly vegetable	43	19	.034	.102	—	—	4.4	18
Average . . .	.....	.....	.....	.....	39	14	.034	.128	—	.03	4.0	17

\*Numerical Turbidity.

TABLE No. 13. — *Chemical Examinations of Water from Lake Cochituate in 1938*  
(Parts per 1,000,000)

DATE OF COLLECTION	APPEARANCE		ODOR		RESIDUE ON EVAPORATION		AMMONIA		Hydrogen-con- centration	Manganese	Chlorine	Hardness
	Turbidity	Sediment	Cold	Hot	Total	Loss on Ignition	Free	Albuminoid				
Jan. 5 . . .	V. slight	V. slight	Faintly vegetable	Faintly vegetable	—	—	.010	.140	—	—	8.0	—
Feb. 2 . . .	V. slight	V. slight	Faintly vegetable	Faintly vegetable	79	25	.110	.134	—	.03	7.6	31
Mar. 10 . . .	V. slight	V. slight	Faintly vegetable	Distinctly vegetable	—	—	.036	.166	—	—	7.6	—
Apr. 6 . . .	V. slight	Slight	V. faintly vegetable	Faintly greasy	73	14	.026	.168	—	—	7.8	29
June 1 . . .	V. slight	Slight	Faintly vegetable	Distinctly unpleasant	—	—	.022	.130	—	—	7.2	—
Aug. 3 . . .	* 4	—	Faintly vegetable	Distinctly vegetable	64	23	.080	.200	—	.02	5.0	29
Oct. 5 . . .	3	—	Faintly vegetable	Distinctly vegetable	—	—	.064	.264	—	—	6.6	—
Nov. 2 . . .	2	—	V. faintly vegetable	Faintly vegetable	75	19	.012	.156	—	—	6.2	29
Dec. 7 . . .	3	—	V. faintly vegetable	Distinctly vegetable	—	—	.040	.160	—	—	7.2	—
Average . .	.....	.....	.....	.....	73	20	.044	.169	—	.03	7.0	30

\*Numerical Turbidity.

TABLE No. 14. — *Chemical Examinations of Water from a tap at the State House, Boston, in 1938*  
(Parts per 1,000,000)

	V. slight	V. slight	Faintly vegetable	Faintly vegetable	43	14	.170	.062	—	.02	4.0	20
Feb. 9 . . .	V. slight	V. slight	Faintly vegetable	Faintly vegetable	—	—	.126	.084	—	—	4.0	—
Mar. 9 . . .	V. slight	V. slight	V. faintly vegetable	Faintly vegetable	41	17	.124	.072	—	—	3.9	17
Apr. 6 . . .	V. slight	V. slight	Faintly vegetable	Faintly vegetable	—	—	.100	.100	—	.02	4.0	—
May 18 . . .	None	None	V. faintly vegetable	Faintly vegetable	42	16	.080	.106	—	—	4.0	20
June 10 . . .	None	—	Faintly vegetable	Faintly vegetable	—	—	.012	.110	—	—	4.0	—
July 12 . . .	3	—	V. faintly vegetable	Distinctly vegetable	50	18	.010	.094	—	.03	4.0	21
Aug. 15 . . .	3	—	Faintly vegetable	Faintly vegetable	—	—	.028	.104	—	—	4.0	—
Sept. 9 . . .	4	—	V. faintly vegetable	Faintly vegetable	52	20	.048	.080	—	—	4.4	17
Nov. 2 . . .	2	—	.....	.....	46	17	.078	.090	—	.02	4.0	19
Average . . .	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

\*Numerical Turbidity.



TABLE No. 15.—*Chemical Examinations of Water from a Faucet in Boston, 1898-1938*  
(Parts per 1,000,000)

YEAR	COLOR	RESIDUE ON EVAPORATION		AMMONIA				Chlorine	Oxygen Consumed	Hardness
				ALBUMINOID						
	Platinum Standard	Total	Loss on Ignition	Free	Total	Dissolved	Suspended			
1898 . . . . .	40	41.9	16.0	.008	.152	.136	.016	2.9	4.4	14
1899 . . . . .	28	37.0	13.0	.006	.136	.122	.014	2.4	3.5	11
1900 . . . . .	29	38.0	12.0	.012	.157	.139	.018	2.5	3.8	13
1901 . . . . .	29	44.3	16.4	.013	.158	.142	.016	3.0	4.2	17
1902 . . . . .	30	39.3	15.6	.016	.139	.119	.020	2.9	4.0	17
1903 . . . . .	29	39.8	15.0	.013	.125	.110	.015	3.0	3.9	15
1904 . . . . .	23	39.3	15.9	.023	.139	.121	.018	3.4	3.7	15
1905 . . . . .	24	38.6	15.9	.020	.145	.124	.021	3.5	3.5	14
1906 . . . . .	24	38.6	13.9	.018	.159	.134	.025	3.4	3.6	13
1907 . . . . .	22	38.3	14.0	.013	.129	.109	.020	3.3	3.2	13
1908 . . . . .	19	35.0	13.5	.011	.115	.092	.024	3.3	2.6	12
1909 . . . . .	18	34.6	14.3	.011	.128	.103	.025	2.8	2.5	13
1910 . . . . .	14	30.5	12.4	.013	.118	.102	.016	2.8	2.2	11
1911 . . . . .	25	41.8	16.6	.015	.156	.128	.029	3.8	3.3	14
1912 . . . . .	17	38.6	12.3	.018	.154	.119	.034	3.6	2.9	17
1913 . . . . .	13	39.6	11.5	.014	.150	.120	.026	3.5	2.6	15
1914 . . . . .	14	41.2	11.9	.014	.138	.116	.022	3.9	2.5	14
1915 . . . . .	16	37.3	10.4	.015	.157	.134	.023	3.8	2.5	14
1916 . . . . .	18	45.3	18.5	.013	.133	.107	.026	3.6	—	14
1917 . . . . .	15	44.5	16.8	.015	.142	.124	.018	3.3	—	13
1918 . . . . .	18	38.9	14.5	.019	.154	.128	.026	2.9	—	14
1919 . . . . .	20	42.8	14.1	.010	.130	.108	.022	3.6	—	15
1920 . . . . .	17	42.3	13.5	.012	.112	.097	.014	3.3	—	15
1921 . . . . .	13	38.0	13.9	.006	.104	.089	.015	2.5	—	14
1922 . . . . .	16	39.8	15.5	.011	.097	.080	.017	3.0	—	18
1923 . . . . .	15	39.0	14.5	.011	.100	.090	.010	2.6	—	15
1924 . . . . .	12	41.0	16.0	.011	.109	.084	.025	2.8	—	15
1925 . . . . .	9	39.8	16.2	.013	.109	.093	.016	2.9	—	15
1926 . . . . .	10	41.8	16.8	.015	.115	.092	.023	3.2	—	15
1927 . . . . .	22	44.7	16.2	.013	.111	.101	.018	3.4	—	19
1928 . . . . .	27	44.3	17.2	.011	.124	.106	.018	3.7	—	15
1929 . . . . .	21	42.6	17.1	.007	.106	.074	.032	3.0	—	13
1930 . . . . .	16	40.7	13.4	.012	.071	.055	.016	3.4	—	13
1931 . . . . .	24	48.8	16.4	.013	.097	.072	.025	4.5	—	20
1932 . . . . .	19	43.5	16.0	.007	.102	.075	.027	3.9	—	16
1933 . . . . .	19	41.5	14.1	.010	.095	.069	.026	4.0	—	19
1934 . . . . .	19	40.3	13.8	.013	.083	.062	.021	3.8	—	19

YEAR	COLOR	RESIDUE ON EVAPORATION		Free Ammonia	Total Albumen Ammonia	Hydrogen-ion Concentration	Manganese	Chlorine	Alkalinity	Hardness
	Platinum Standard	Total	Loss on Ignition							
1935 . . . . .	17	42.9	15.6	.027	.095	6.7	.025	4.0	—	17
1936 . . . . .	15	37.8	12.8	.009	.099	6.8	.020	3.9	—	18
1937 . . . . .	19	41.0	13.8	.041	.093	6.6	.020	4.0	—	18
1938 . . . . .	25	45.8	17.0	.078	.090	—	.020	4.0	10.2	19

TABLE No. 16.—*Number of Bacteria per Cubic Centimeter in Water at Various Places on the Metropolitan Water Works, 1898-1938*

(Averages of Weekly Determination)

YEAR	CHESTNUT HILL RESERVOIR			SOUTHERN SERVICE TAPS	
	Sudbury Aqueduct Terminal Chamber	Cochituate Aqueduct	Effluent Gate House No. 2	Low Service 182 Boylston Street	High Service 20 Somerset Street
1898	207	145	111	96	—
1899	224	104	217	117	123
1900	248	113	256	188	181
1901	225	149	169	162	168
1902	203	168	121	164	246
1903	76	120	96	126	243
1904	347	172	220	176	355
1905	495	396	489	231	442
1906	231	145	246	154	261
1907	147	246	118	130	176
1908	162	138	137	136	148
1909	198	229	119	150	195
1910	216	—	180	178	213
1911	205	204	151	175	197
1912	429	450	227	249	259
1913	123	243	157	119	140
1914	288	—	252	174	220
1915	163	—	128	117	134
1916	128	—	85	102	105
1917	178	112	119	119	141
1918	1,163	168	705	317	544
1919	92	85	100	70	84
1920	148	86	108	113	112
1921	103	—	83	92	92
1922	163	—	153	160	172
1923	229	—	178	217	230
1924	137	—	96	150	160
1925	144	251	120	155	174
1926	167	—	118	130	137
1927	119	185	70	81	101
1928	144	32	86	106	106
1929	128	—	84	130	144
1930	107	—	66	105	123
1931	82*	4*	43	80	101
1932	121*	—	63	123	147
1933	20*	—	15	40	45
1934	10*	—	26	42	31
1935	4*	—	32	35	18
1936	21*	—	56	51	59
1937	12*	—	50	90	21
1938	3*	—	49	13	14

\*After the water was sterilized with chlorine.

TABLE No. 17.— Colors of Water at Various Places on the Metropolitan Water Works in 1938  
(Platinum Standard)

MONTH	WACHUSETT <sup>1</sup> RESERVOIR						WACHUSETT AQUEDUCT INFLUENT	SUBBURY <sup>1</sup> RESERVOIR			FRAMINGHAM RESERVOIR No. 3	LAKE <sup>1</sup> COCHITUATE			CHESTNUT HILL RESERVOIR			SPOT <sup>1</sup> POND	FELLS RESERVOIR	SOUTHERN SERVICE		NORTHERN SERVICE	
	Quinapoxet River Influent	Stillwater River Influent	Worcester St. Bridge	Surface near Dam	Mid-depth near Dam	Bottom near Dam		Surface near Dam	Mid-depth near Dam	Bottom near Dam		Surface near Gate House	Mid-depth near Gate House	Bottom near Gate House	Sudbury Aqueduct Influent	Cochituate Aqueduct Influent	Effluent Gate House No. 2			Mid-depth near East Gate House	Effluent Gate House	Tap at 182 Boylston St., Boston, Low Service	Tap at 20 Somerset St., Boston, High Service
January . . .	31	28	28	14	16	18	17	22	24	23	24	24	24	22	—	16	11	12	23	22	25	14	
February . . .	28	24	26	15	15	15	19	18	17	20	26	26	28	18	—	14	10	10	19	19	21	12	
March . . .	28	25	23	16	16	16	20	19	19	20	25	25	24	17	—	15	12	12	19	19	21	13	
April . . .	36	33	28	17	16	18	20	19	19	21	23	23	24	18	—	16	12	12	20	20	20	13	
May . . .	47	46	33	18	17	18	37	21	20	21	31	31	22	19	—	15	12	12	20	20	20	13	
June . . .	63	59	32	18	18	18	31	22	21	23	24	22	22	21	—	18	12	12	22	22	19	12	
July . . .	68	65	27	15	17	18	43	25	26	23	29	25	25	23	—	18	11	11	22	22	20	12	
August . . .	64	60	41	18	19	18	25	37	38	36	33	54	27	113	—	23	12	16	32	32	29	17	
September . . .	55	47	27	21	20	19	32	32	31	32	—	45	29	75	—	25	12	18	30	30	29	17	
October . . .	—	—	—	—	—	—	—	—	—	—	38	38	36	89	—	28	15	23	—	—	—	—	
November . . .	47	42	26	22	22	22	40	33	37	34	—	41	—	—	—	31	16	22	34	34	33	23	
December . . .	39	35	39	22	22	22	50	34	33	34	—	—	—	—	—	31	16	22	34	34	33	24	
Mean . . .	46	42	30	18	18	18	30	26	26	26	26	31	26	55	—	20	12	15	25	25	24	15	

<sup>1</sup> Mid-depth and bottom colors are averages of bi-weekly determinations; all others are averages of weekly determinations.



TABLE No. 18.—*Temperatures of Water at Various Places on the Metropolitan Water Works in 1938*

The temperatures are taken at the same places and times as the samples for microscopical examination, the depth at place of observation from high-water mark. (Degrees Fahrenheit)

MONTH	WACHUSETT <sup>1</sup> RESERVOIR DEPTH AT PLACE OF OBSERVATION NEAR DAM 107 FEET			SUDBURY <sup>1</sup> RESERVOIR DEPTH AT PLACE OF OBSERVATION NEAR DAM 54.5 FEET			FRAMINGHAM <sup>1</sup> RESERVOIR No. 3 DEPTH AT PLACE OF OBSERVATION NEAR DAM 20.5 FEET			LAKE <sup>1</sup> COCHITUATE DEPTH AT PLACE OF OBSERVATION NEAR GATE HOUSE 62.0 FEET			CHEST- NUT HILL RESER- VOIR			SPOT POND <sup>1</sup> DEPTH AT PLACE OF OBSERVATION NEAR EAST GATE HOUSE 28.0 FEET			SOUTHERN SERVICE		NORTHERN SERVICE	
	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Tap at 182 Boylston St., Boston, Low Service	Tap at 20 Somerset St., Boston, High Service	Tap at Glenwood Yard, Medford, Low Service	Tap at Glenwood Yard, Medford, High Service
January	33.1	36.9	34.8	35.3	38.8	37.8	36.4	38.0	36.5	35.2	35.9	54.7	37.6	34.9	35.2	40.1	40.0	40.4	40.4	41.5	40.4	41.5
February	34.5	36.8	37.2	36.6	37.0	37.8	37.5	—	—	37.5	37.0	37.7	39.0	37.0	38.1	38.9	39.9	39.6	39.6	40.6	40.6	40.2
March	41.7	38.4	39.0	37.4	42.0	39.0	39.5	46.0	47.0	40.0	41.7	41.1	38.4	38.6	39.3	41.5	41.9	40.7	40.7	43.4	47.9	45.4
April	44.4	44.1	42.7	44.3	49.3	45.3	48.6	50.8	59.0	50.1	46.1	44.8	49.2	46.9	47.3	50.0	51.0	55.8	55.8	52.6	55.8	52.6
May	54.7	54.4	50.6	54.6	57.0	55.1	58.9	60.5	66.3	59.7	49.5	47.9	58.7	58.0	57.3	59.0	59.5	63.7	63.7	60.3	63.7	60.3
June	66.1	61.8	52.7	57.8	62.0	63.3	69.0	68.0	66.3	70.2	50.6	49.9	68.1	69.0	60.5	67.9	72.0	65.4	65.1	72.0	65.1	69.0
July	73.4	66.5	55.9	61.9	69.3	64.0	72.6	72.3	70.0	73.5	54.9	50.0	75.4	73.3	70.3	72.8	76.2	71.5	69.0	71.5	69.0	65.1
August	75.2	73.1	57.5	63.6	72.0	69.2	75.9	74.5	72.8	78.2	55.5	44.8	66.8	77.1	70.3	75.2	76.2	68.7	65.5	71.5	65.5	69.0
September	66.3	67.5	55.9	60.3	67.0	67.5	67.0	—	67.0	67.1	54.3	49.5	59.8	59.3	65.7	68.7	69.5	68.5	65.5	68.5	65.5	69.0
October	61.2	60.1	57.5	57.8	59.0	61.8	57.8	57.3	58.8	58.9	57.5	49.2	59.8	59.3	59.3	61.6	62.3	62.5	62.5	60.8	62.5	60.8
November	53.0	54.5	54.2	49.4	53.0	54.5	48.6	52.0	51.3	51.0	52.5	48.8	51.1	50.3	51.8	54.5	54.2	56.4	56.4	55.5	56.4	55.5
December	40.1	39.5	39.1	40.8	39.3	38.5	36.3	—	—	40.4	—	—	38.0	37.5	37.8	42.5	41.6	45.6	45.6	45.0	45.6	45.0
Mean	53.6	52.8	48.1	50.4	53.8	52.8	54.0	57.7	58.7	55.2	48.7	47.1	54.5	54.1	52.5	56.0	56.5	54.8	54.8	53.5	54.8	53.5

<sup>1</sup> Mid-depth and bottom temperatures are averages of bi-weekly determinations; all others are averages of weekly determinations.

TABLE No. 19.—Length of Metropolitan Water Works Main Lines and Connections and Number of Valves set in Same,  
December 31, 1938

(Pipes are of cast-iron unless otherwise noted)

Diameter of pipes in inches																			
	60	56	54	48	42	40	38	36	30	24	20	16	14	12	10	8	6	4	Total
Total length owned and operated Dec. 31, 1937 (feet) . . . . .	130,179	17,634	13,486	240,517	11,733	6,887	7,274	64,132	78,375	101,572	151,348	79,856	26	30,298	724	1,964	1,210	58	937,273
Gate Valves in same . . . . .	22	2	5	66	3	3	—	80	50	71	107	154	1	164	22	33	28	2	813
Air Valves in same . . . . .	190	9	12	170	10	5	6	49	46	60	100	43	—	10	1	—	—	—	711
Length laid or relaid during 1938 (feet) . . . . .	—	—	—	4,109	485	—	—	2,008	12	60	2,038	322	—	419	—	—	—	—	9,453
Gate Valves in same . . . . .	—	—	—	—	—	—	—	1	—	1	—	2	—	7	—	—	—	—	11
Air Valves in same . . . . .	—	—	—	7	2	—	—	1	—	1	1	3	—	4	—	—	—	—	19
Length abandoned during 1938 (feet) . . . . .	—	—	—	10	—	—	—	90	12	12	—	3	—	229	—	—	—	—	356
Gate Valves in same . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Air Valves in same . . . . .	—	—	—	—	—	—	—	1	—	—	—	3	—	—	—	—	—	—	4
Length owned and operated Dec. 31, 1938 (feet) . . . . .	130,179	17,634 <sup>2</sup>	13,486 <sup>2</sup>	244,616 <sup>3</sup>	12,218 <sup>4</sup>	6,887	7,274 <sup>2</sup>	66,050 <sup>5</sup>	78,375 <sup>6</sup>	101,620 <sup>7</sup>	153,386 <sup>8</sup>	80,175 <sup>9</sup>	26	30,488 <sup>10</sup>	724	1,964	1,210	58	946,370 <sup>11</sup>
Gate Valves in same . . . . .	22	2	5	66	3	3	—	81	50	72	107	156	1	171	22	33	28	2	824
Air Valves in same . . . . .	190	9	12	177	12	5	6	49	46	61	101	43	—	14	1	—	—	—	726

<sup>1</sup> Includes 2,035 feet of 76-inch concrete-lined pressure tunnel; 363 feet of 76-inch mortar-lined and concrete-covered steel pipe; 21 feet of 76-inch cast-iron pipe; 85 feet of 60 inch concrete-covered steel pipe, and 82,624 feet of 60-inch steel pipe.

<sup>2</sup> Steel pipe.

<sup>3</sup> Includes 28,980 feet of steel pipe.

<sup>4</sup> Includes 2,338 feet of steel pipe.

<sup>5</sup> Includes 2,198 feet of steel pipe.

<sup>6</sup> Includes 15,512 feet of mortar-lined and covered wrought-iron pipe; and 26,650 feet of steel pipe.

<sup>7</sup> Includes 55 feet of steel pipe.

<sup>8</sup> Includes 33,317 feet of cement-lined cast-iron pipe and 1,151 feet of steel pipe.

<sup>9</sup> Includes 1,856 feet of cement-lined cast-iron pipe and 3 feet of steel pipe.

<sup>10</sup> Includes 627 feet of cement-lined cast-iron pipe.

<sup>11</sup> 179.24 miles.

TABLE No. 20. — *Length of Metropolitan Water Works Hydrant, Blow-off and Drain Pipes, December 31, 1938*  
(All pipes are of cast iron)

	DIAMETER OF PIPES IN INCHES										Total
	24	20	16	12	10	8	6	4			
Total length in use Dec. 31, 1937 (feet).	352	292	4,270	8,455	233	1,315	4,825	1,947			21,689
Valves in same . . . . .	—	—	60	143	2	20	118	55			398
Length laid or relaid in 1938 (feet) . . . . .	—	—	—	150	—	—	19	39			208
Valves in same . . . . .	—	—	—	2	—	—	1	1			4
Length abandoned in 1938 (feet) . . . . .	—	—	—	—	—	—	—	40			40
Valves in same . . . . .	—	—	1	—	—	—	—	—			1
Total length in use Dec. 31, 1938 (feet) . . . . .	352	292	4,270	8,605	233	1,315	4,844	1,946			21,837 <sup>1</sup>
Valves in same . . . . .	—	—	59	145	2	20	119	56			401

14.14 miles.



TABLE No. 21.—Length of Metropolitan Water Works Main Lines and Connections and Water Pipes, Four Inches in Diameter and Larger, in the Several Cities and Towns in the Metropolitan Water District, December 31, 1938

By Whom Owned	DIAMETER OF PIPES IN INCHES																	Totals			
	60	56	54	48	42	40	38	36	30	24	20	18	16	14	12	10	8	6	4	Feet	Miles
Met. Water Wks.	130,179	17,634	13,486	244,616	12,218	6,887	7,274	66,050	78,375	101,620	153,386	—	80,175	26	30,488	724	1,964	1,210	58	946,370	179.24
Arlington . . .	—	—	—	—	—	—	—	—	—	—	—	—	2,388	—	49,164	42,862	132,171	255,471	380	482,436	91.37
Belmont . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16,311	51,814	93,271	215,989	269	377,654	71.53
Boston . . .	—	—	—	41,385	15,980	9,599	—	44,448	90,053	89,451	107,995	—	365,480	285	1,823,507	451,163	1,169,074	993,432	64,431	5,266,283	997.40
Brookline . . .	—	—	—	—	—	—	—	—	—	10,007	27,292	—	26,802	12,880	66,487	91,518	119,820	278,092	250	633,148	119.91
Chelesea . . .	—	—	—	—	—	—	—	—	—	—	4,530	—	4,685	—	6,012	43,680	38,305	161,064	—	258,276	48.92
Everitt . . .	—	—	—	—	—	—	—	—	—	2,484	2,900	—	21,270	6,619	10,092	47,545	41,521	165,819	14,017	312,267	59.14
Lexington . . .	—	—	—	—	—	—	—	—	—	—	—	—	4,382	—	48,941	17,871	76,996	197,592	21,628	367,410	69.59
Malden . . .	—	—	—	—	—	—	—	—	—	—	—	—	12,759	11,142	101,565	38,493	126,906	237,571	43,359	571,795	108.29
Medford . . .	—	—	—	—	—	—	—	—	—	—	673	—	6,775	9,598	49,611	49,713	150,386	311,485	799	579,040	109.67
Melrose . . .	—	—	—	—	—	—	—	—	—	—	—	—	12,464	3,024	26,223	29,617	30,907	213,606	47,050	362,891	68.73
Milton . . .	—	—	—	—	—	—	—	—	—	—	—	—	4,579	72	95,042	23,989	110,659	241,885	7,645	483,871	91.64
Nahant . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	10,444	5,550	11,550	13,643	39,186	58,276	138,649	26.26
Newton . . .	—	—	—	—	—	—	—	—	—	—	36,250	—	15,023	—	120,562	8,410	235,421	767,544	55,805	1,239,015	234.66
Quincy . . .	—	—	—	—	—	—	—	—	—	—	15,542	—	35,648	—	85,097	102,713	264,227	462,666	62,354	1,028,247	194.74
Revere . . .	—	—	—	—	—	—	—	—	—	—	—	—	10,470	8,195	38,016	36,010	102,485	138,151	19,430	352,757	66.81
Somerville . . .	—	—	—	—	—	—	—	—	—	—	5,577	367	10,094	7,942	140,266	98,430	110,581	197,581	15,699	586,543	111.09
Stoneham . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8,985	13,539	35,094	111,416	17,688	186,722	35.36
Swampscott . . .	—	—	—	—	—	—	—	—	—	—	—	—	150	3,752	10,950	21,800	8,208	124,517	3,994	173,371	32.83
Watertown . . .	—	—	—	—	—	—	—	—	—	—	—	—	2,991	6,718	16,245	49,935	95,468	179,600	3,782	354,739	67.19
Winthrop . . .	—	—	—	—	—	—	—	—	—	—	5,151	—	4,327	—	5,302	24,198	91,916	52,387	11,197	194,478	36.83
Total feet . . .	130,179	17,634	13,486	286,001	28,198	16,486	7,274	110,498	168,428	203,562	359,296	367	620,462	80,637	2,754,416	1,255,574	3,049,029	5,346,264	448,111	14,895,962	—
Total miles . . .	24.65	3.34	2.55	54.17	5.34	3.12	1.38	20.93	31.90	38.55	68.05	0.07	117.51	15.28	521.67	237.80	577.47	1,012.55	84.87	—	2,821.20

TABLE NO. 22.— *Number of Service Pipes, Meters, Per Cent of Services Metered, Fire Services and Fire Hydrants in the Several Cities and Towns in the Metropolitan Water District, December 31, 1938*

CITY OR TOWN	Services	Meters	Per Cent of Services Metered	Services Used for Fire Purposes Only	Fire Hydrants
Arlington . . . . .	7,812	7,810	99.97	33	938
Belmont . . . . .	5,143	5,143	100.00	13	550
Boston . . . . .	102,009	102,009	100.00	3,138	12,191
Chelsea . . . . .	5,730	5,730	100.00	152	463
Everett . . . . .	7,392	7,392	100.00	55	656
Lexington . . . . .	2,715	2,715	100.00	17	553
Malden . . . . .	9,799	9,784	99.85	79	755
Medford . . . . .	10,889	10,887	99.98	38	1,117
Melrose . . . . .	6,206	6,206	100.00	25	483
Milton . . . . .	4,752	4,752	100.00	8	722
Nahant . . . . .	921	921	100.00	2	144
Quincy . . . . .	16,389	16,389	100.00	53	1,829
Revere . . . . .	6,500	6,495	99.92	14	528
Somerville . . . . .	13,944	13,783	98.85	132	1,429
Stoneham . . . . .	2,421	2,421	100.00	3	200
Swampscott . . . . .	2,814	2,814	100.00	8	296
Watertown . . . . .	6,113	6,113	100.00	43	742
Winthrop . . . . .	3,926	3,926	100.00	6	389
District Supplied . . . . .	215,475	215,290	99.91	3,819	23,985
Brookline . . . . .	8,100	8,095	99.94	58	1,217
Newton . . . . .	16,017	16,017	100.00	102	1,790
Total District . . . . .	239,592	239,402	99.92	3,979	26,992

TABLE No. 23.—Elevation of the Hydraulic Grade Line, in Feet, above Boston City Base for Each Month at Stations on Metropolitan Water Works during 1938

1938 MONTH	LOW SERVICE															
	WATERTOWN, PLEASANT STREET AT WALTHAM LINE		BELMONT, WATER WORKS SHOP, WAVER- LEY STREET		BOSTON, BOWDOIN SQUARE ENGINE HOUSE		ALLSTON, ENGINE HOUSE, HARVARD STREET		MEDFORD, NEAR MYSTIC RESERVOIR		SOMERVILLE, PUBLIC LIBRARY, HIGHLAND AVENUE		MALDEN, WATER WORKS SHOP, GREEN STREET		CHELSEA, FIRE STATION, PARK STREET	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January	193	188	190	185	150	141	179	177	164	160	164	156	164	151	164	150
February	193	188	190	186	150	141	179	168	166	159	164	156	164	151	164	150
March	193	186	191	183	150	137	179	170	166	160	165	157	164	151	164	150
April	193	186	192	186	152	141	176	170	167	162	167	156	165	152	164	150
May	195	188	194	188	152	143	175	170	167	162	165	156	164	153	164	152
June	195	188	194	186	150	141	175	168	167	160	164	156	163	151	159	150
July	195	186	194	185	152	141	175	167	169	162	165	156	164	153	159	150
August	194	186	194	183	150	138	175	168	169	162	167	155	165	152	159	150
September	194	186	194	184	149	141	175	168	169	161	165	156	164	153	159	152
October	194	188	194	188	150	141	172	168	168	160	164	156	163	155	161	152
November	194	188	192	188	150	141	172	168	167	160	164	156	163	155	159	154
December	194	191	194	190	149	138	172	168	164	159	164	155	164	153	159	152
Averages	194	187	193	186	150	140	175	169	167	161	165	156	164	153	161	151



TABLE No. 23. — Concluded — Elevation of the Hydraulic Grade Line, in Feet, above Boston City Base, etc.

1938 MONTH	SOUTHERN HIGH SERVICE						NORTHERN HIGH SERVICE						INTERMEDIATE HIGH SERVICE		NORTHERN EXTRA HIGH SERVICE					
	BOSTON, BOWDOIN SQUARE ENGINE HOUSE		MILTON, ADAMS STREET AT CANTON AVENUE		QUINCY, FORBES HILL TOWER		QUINCY, WATER WORKS SHOP		SOMERVILLE, BROADWAY AT CEDAR ST.		REVERE, WATER WORKS SHOP, BROADWAY		LYNN, ENGINE HOUSE, UNION SQUARE		WINTHROP, TOWN HALL, HERMAN STREET		BELMONT, COMMON ST. AT WASHINGTON STREET		LEXINGTON, MASSACHU- SETTS AVE. AT ARLINGTON LINE	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January .	245	228	246	221	246	219	244	215	263	237	262	250	261	241	196	188	317	306	434	417
February .	245	228	248	226	246	224	244	214	263	233	262	248	261	247	198	189	317	306	434	420
March .	245	201 <sup>1</sup>	247	226	247	222	244	215	263	230	262	251	261	250	198	189	317	303	435	420
April .	245	201 <sup>1</sup>	248	226	247	223	244	214	263	228	262	251	261	250	198	189	317	306	435	418
May .	245	228	249	227	246	224	244	216	263	237	260	243	258	240	197	184	317	306	434	418
June .	245	221	248	221	246	219	244	209	263	230	260	239	258	231	194	173	317	306	434	417
July .	245	219	248	225	245	222	242	214	263	236	260	243	258	236	194	184	316	307	435	413
August .	242	215	248	225	244	219	242	209	263	236	260	239	258	236	194	182	316	303	434	417
September .	245	215	247	221	244	219	242	214	263	237	260	248	258	241	196	187	317	303	432	413
October .	245	226	248	225	245	219	242	212	263	235	262	248	260	247	197	188	317	306	432	418
November .	245	226	247	227	245	224	242	215	263	230	262	252	260	250	198	191	317	306	432	422
December .	245	224	248	226	245	224	242	219	260	236	262	248	260	250	198	177	317	306	432	419
Averages .	245	219	248	225	246	222	243	214	263	234	261	247	260	243	197	185	317	305	434	418

<sup>1</sup> Section of 42" Boston Water Works main, Huntington Ave., closed.

APPENDIX No. 6

Information relating to areas, populations, local sewer connections and other data for the Metropolitan sewerage districts appears in the following table:

*North Metropolitan Sewerage District*

Area (Square Miles)	Estimated Total Population	Miles of Local Sewer Connected	Estimated Population Contributing Sewage	Ratio of Contributing Population to Total Population Per Cent.	CONNECTIONS MADE WITH METROPOLITAN SEWERS	
					Public	Special
101.49	752,660	1,040.08	692,750	92.04	400	765

*South Metropolitan Sewerage District*

208.52	762,830	1,121.25	572,940	75.11	229	94
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*Both Metropolitan Sewerage Districts*

310.01	1,515,490	2,161.33	1,265,690	83.51	629	859
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Of the estimated gross population of 1,515,490 on December 31, 1938, 1,265,690, representing 83.51 per cent. were on that date contributing sewage to the Metropolitan sewers, through a total length of 2,161.33 miles of local sewers owned by the individual cities and towns of the districts.

These sewers are connected with the Metropolitan Systems by 629 public and 859 special connections. During the current year there has been an increase of 57.08 miles of local sewers connected with the Metropolitan Systems, and 8 public and 9 special connections have been added.

NORTH METROPOLITAN SEWERAGE SYSTEM

Location, Length and Sizes of Sewers, with Public and Special Connections

CITY OR TOWN	SIZE OF SEWERS	Length in Miles	Public Connections, December 31, 1938	SPECIAL CONNECTIONS	
				Character or Location of Connections added in 1938	Number in Operation
Boston:					
Deer Island	4'0" to 9'0" . . . . .	1.653	4	- - - - -	1
East Boston	9'0" to 1'0" . . . . .	5.467	25	- - - - -	3
Charlestown	6'7" x 7'5" to 1'0" . . . . .	3.292	15	- - - - -	11
Winthrop	9'0" . . . . .	2.864	14	- - - - -	3
				- - - - -	8
Chelsea . .	8'4" x 9'2" to 15" . . . . .	5.230	14	Temporary drainage of abandoned pit . . . . .	1
Everett . .	8'2" x 8'10" to 4'8" x 5'1" . . . . .	2.925	10		11
Lexington <sup>1</sup> .	1'3" to 2'3" . . . . .	.002	2	- - - - -	-
				- - - - -	251 <sup>3</sup>
Malden . .	4'6" x 4'10" to 1'0" . . . . .	5.844 <sup>2</sup>	40	Gasoline filling station . . . . .	1
Melrose . .	4'6" x 4'10" to 10" . . . . .	6.099 <sup>4</sup>	43		137 <sup>5</sup>
Cambridge .	5'2" x 5'9" to 1'3" . . . . .	7.899	60	- - - - -	13
Somerville .	6'5" x 7'2" to 10" . . . . .	3.577	16	- - - - -	9
Medford . .	8'6" x 8'6" to 10" . . . . .	10.989	28	- - - - -	20
				Block of stores . . . . .	1
				- - - - -	32
Winchester .	5'6" x 5'9" to 15" . . . . .	13.496	36	Church . . . . .	1
				Private house . . . . .	1
Stoneham . .	3'0" to 10" . . . . .	4.026	12	- - - - -	-
Woburn . .	4'2" x 4'5" to 15" . . . . .	1.783	4	- - - - -	6
				- - - - -	253 <sup>7</sup>
Arlington . .	3'0" x 3'6" to 10" . . . . .	6.723 <sup>6</sup>	67	Private house . . . . .	1
Belmont . .	1'3" to 2'6" . . . . .	0.008	5		-
Wakefield .	3'0" to 2'0" x 2'3" . . . . .	0.703	1	- - - - -	1
Revere . .	4'0" to 15" . . . . .	0.136	3	- - - - -	-
Reading . .	1'4" to 3'0" . . . . .	0.055	1	- - - - -	-
		82.771 <sup>8</sup>	400		765

<sup>1</sup> The Metropolitan Sewers extend but a few feet into the town of Lexington.

<sup>2</sup> Includes 1.84 miles of sewer purchased from the city of Malden.

<sup>3</sup> Mostly buildings connected with sewers formerly belonging to city of Malden but later purchased by the Metropolitan Sewerage Commission in accordance with Chapter 215 of the Acts of 1898 and by the Metropolitan Water and Sewerage Board in accordance with Chapter 512 of the Acts of 1911 and made parts of the North Metropolitan Sewerage System.

<sup>4</sup> Includes 0.736 of a mile of sewer purchased from the city of Melrose.

<sup>5</sup> Mostly buildings connected with a sewer formerly belonging to the city of Melrose but later purchased by the Metropolitan Sewerage Commission in accordance with Chapter 414 of the Acts of 1896 and with a sewer extension built in accordance with Chapter 436 of the Acts of 1897 by the Metropolitan Sewerage Commission as an outlet for part of the town of Stoneham and made parts of the North Metropolitan Sewerage System.

<sup>6</sup> Includes 2.631 miles of sewer purchased from the town of Arlington.

<sup>7</sup> Mostly buildings connected with a sewer formerly belonging to the town of Arlington but later purchased by the Metropolitan Sewerage Commission in accordance with Chapter 520 of the Acts of 1897 and made a part of the North Metropolitan Sewerage System.

<sup>8</sup> Includes 2.787 miles of Old Mystic Valley Sewer in Medford and Winchester, running parallel with the Metropolitan Sewer.



SOUTH METROPOLITAN SEWERAGE SYSTEM

Location, Length and Sizes of Sewers, with Public and Special Connections

CITY OR TOWN	SIZE OF SEWERS	Length in Miles	Public Con- nections, Decem- ber 31, 1938	SPECIAL CONNECTIONS	
				Character or Location of Connections added in 1938	Number in Operation
Boston:					
Back Bay .	6'6" to 3'9" . . . .	1.500 <sup>1</sup>	17	- - - -	7
Brighton .	7'0" to 12" . . . .	6.405 <sup>2</sup>	16	- - - -	7
Dorchester .	3' x 4' to 2'6" x 2'7" . .	2.870 <sup>3</sup>	14	- - - -	9
Hyde Park .	10'7" x 11'7" to 30" pipe	4.543	20	- - - -	5
Roxbury .	6'6" x 7' to 4'0" . . . .	1.430	-	- - - -	-
West Roxbury	9'3" x 10'2" to 12" . . .	7.643	27	- - - -	13
Brookline .	6'6" x 7'0" to 8" . . . .	2.540 <sup>4</sup>	14	Bath house . . . .	1
Dedham .	4' x 4'1" to 2'9" x 3' . .	5.012	11	Private house . . . .	1
Hull <sup>5</sup> .	60" pipe . . . . .	0.750	-	- - - -	2
Milton .	11' x 12' to 8" . . . .	7.127	41	- - - -	3
Newton .	5'3" x 5'6" to 1'3" . . . .	2.912	15	- - - -	4
Quincy .	11'3" x 12'6" to 16" pipe	8.738	33	- - - -	17
Waltham .	3'6" x 4'0" . . . . .	0.001	1	- - - -	2
Watertown .	4'2" x 4'9" to 12" . . . .	0.750 <sup>6</sup>	8	- - - -	-
Needham .	2'0" x 2'3" to 2'3" x 2'6"	4.921	1	- - - -	6
Wellesley <sup>7</sup> .	2'0" x 2'3" . . . . .	-	1	- - - -	9
Canton .	4'6" x 5'0" to 20" . . . .	7.243	4	- - - -	1
Norwood .	4'0" x 4'3" to 30" pipe . .	2.844	3	Block of stores . . . .	6
Stoughton <sup>7</sup> .	- - - - -	-	1	- - - -	1
Walpole <sup>7</sup> .	- - - - -	-	1	- - - -	-
Braintree .	30" pipe . . . . .	0.071	1	- - - -	-
Weymouth .	4'9" x 5'0" to 30" pipe . .	1.346	-	- - - -	-
		68.646	229		94

<sup>1</sup> Includes 0.355 of a mile of sewer purchased from the city of Boston.  
<sup>2</sup> Includes 0.446 of a mile of pipe and concrete sewers built for the use of the city of Boston; also 0.026 of a mile of sewer purchased from the town of Watertown.  
<sup>3</sup> Includes 1.24 miles of sewer purchased from the city of Boston.  
<sup>4</sup> Includes 0.158 of a mile of pipe sewer built for the use of the town of Brookline.  
<sup>5</sup> Hull is not a part of the Metropolitan Sewerage District.  
<sup>6</sup> Includes 0.025 of a mile of sewer purchased from the town of Watertown.  
<sup>7</sup> The Metropolitan Sewer extends but a few feet into the towns of Wellesley, Walpole, and Stoughton.

## NORTH METROPOLITAN SEWERAGE SYSTEM

*Table showing Cities and Towns delivering Sewage to this System; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas; Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.*

(Populations estimated as of December 31, 1938)

CITIES AND TOWNS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection <sup>1</sup>	Estimated Population Now Contributing Sewage	Estimated Present Total Population	Estimated Area Now Contributing Sewage	Area Ultimately to Contribute to Sewage	Ratio of Contributing Population to Present Total Population	Ratio of Contributing Area to Ultimate Area
Boston (Deer Island)	0.70	Separate	—	—	820 <sup>2</sup>	820 <sup>2</sup>	—	—	—	—
Winthrop	34.04	Separate	3,986	4.27	17,040	17,130	1.44	1.61	99.47	89.44
Boston (East Boston)	36.01	Separate and combined	5,565	11.30	62,880	66,580	1.27	2.18	94.44	58.26
Chelsea	37.80	Separate and combined	4,577	8.63	39,500	40,010	1.23	2.07	98.73	59.42
Everett	53.59	Separate and combined	7,252	6.35	46,030	46,230	2.15	2.92	99.57	73.63
Malden	84.04	Separate	9,736	5.77	56,200	56,640	3.66	4.16	99.22	87.98
Melrose	55.95	Separate	5,383	4.35	23,420	25,180	2.33	3.81	93.01	61.15
Boston (Charlestown)	22.18	Separate and combined	5,623	4.96	27,870	27,970	0.67	1.27	99.64	52.76
Cambridge	157.63	Separate and combined	19,335	6.29	121,700	121,810	5.33	5.43	99.91	98.16
Somerville	115.01	Separate and combined	18,548	5.27	97,800	98,120	3.86	3.96	99.67	97.47
Medford	102.85	Separate	11,029	5.59	61,600	62,900	4.60	6.11	97.93	75.29
Winchester	46.19	Separate	3,091	4.49	13,880	13,920	2.15	5.31	99.71	40.49
Woburn	30.33	Separate	2,076	5.46	11,330	19,920	1.45	12.23	56.88	11.86
Stoneham	21.80	Separate	1,702	4.61	7,850	11,500	1.09	4.27	68.26	25.53
Arlington	74.69	Separate	6,864	5.52	37,890	40,600	3.25	4.73	93.33	68.71
Belmont	56.81	Separate	3,900	5.68	22,150 <sup>3</sup>	28,240 <sup>3</sup>	2.74	3.78	81.33	72.49
Wakefield	28.30	Separate	1,828	4.81	8,790	16,640	1.57	6.36	52.82	24.69
Lexington	18.61	Separate	828	4.33	3,590	11,940	0.98	15.98	30.07	6.13
Revere	52.24	Separate	5,510	5.43	29,920	35,020	2.59	5.55	85.38	46.67
Reading	11.31	Separate	593	4.20	2,490	11,490	0.54	9.76	21.67	5.53
Totals	1,040.08	—	117,426	5.67	692,750	752,660	42.90	101.49	92.04	42.27

<sup>1</sup> Estimated from Assessors' statement of the number of houses in each city or town on December 31, 1938 and the population from census of 1935.

<sup>2</sup> Estimated by Superintendent of the Institution on Deer Island.

<sup>3</sup> Including 2 connections with McLean Hospital, having an estimated population of 821.

SOUTH METROPOLITAN SEWERAGE SYSTEM

Table showing Cities and Towns delivering Sewage to this System; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas; Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.

(Populations estimated as of December 31, 1938)

CITIES AND TOWNS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection <sup>1</sup>	Estimated Population Now Contributing Sewage	Estimated Present Total Population	Estimated Area Now Contributing Sewage	Area Ultimately to Contribute to Sewage	Ratio of Contributing Population to Present Total Population	Ratio of Contributing Area to Ultimate Area
Boston (Back Bay)	27.84	Separate and combined	2,259	10.29	23,250	23,310	1.17	1.61	99.74	72.67
Boston (Brighton)	75.28	Separate and combined	6,062	11.86	71,900	75,370	3.46	3.74	95.40	92.51
Brookline	100.59	Separate and combined	7,852	6.66	52,300	52,700	4.71	5.35	99.24	88.04
Newton	197.17	Separate	13,945	4.47	62,330	66,860	9.67	16.00	93.22	60.44
Watertown	64.14	Separate	6,187	5.90	36,470	36,610	2.97	3.83	99.62	77.55
Waltham	65.73 <sup>6</sup>	Separate	5,569	7.40	44,120 <sup>5</sup>	44,580 <sup>5</sup>	3.67	11.40	98.97	32.20
Boston (Dorchester)	74.85	Separate and combined	8,467	8.35	70,700 <sup>2</sup>	74,280 <sup>2</sup>	3.05	4.89	95.18	62.37
Milton	40.79	Separate and combined	3,275	4.27	13,980 <sup>2</sup>	19,600 <sup>2</sup>	1.70	9.59	71.33	17.72
Boston (Hyde Park)	46.14	Separate	3,533	13.35	47,150	47,620	2.03	4.57	99.01	44.42
Dedham	27.19	Separate	1,694	4.45	7,540	15,570	1.28	9.66	48.43	13.25
Boston (Roxbury) <sup>3</sup>	—	—	—	—	—	75,660 <sup>2</sup>	—	1.23	—	—
Boston (West Roxbury)	101.17	Separate and combined	8,028	5.07	40,700 <sup>2,4</sup>	41,470 <sup>2,4</sup>	3.92	8.92	98.14	43.95
Quincy	157.61	Separate	13,703	5.28	72,350	81,060	6.03	11.46	89.25	52.62
Wellesley	47.41	Separate	2,019	3.88	7,830	15,000	2.34	9.89	52.20	23.66
Needham	20.19	Separate	955	4.07	3,890	12,650	0.92	11.44	30.75	8.04
Canton	3.35	Separate	322	4.91	1,580	7,090	0.16	17.84	22.28	0.90
Norwood	33.25	Separate	2,271	5.94	13,490	16,020	1.76	10.16	84.21	17.32
Stoughton	5.75	Separate	122	4.33	530 <sup>7</sup>	8,710	0.07	16.23	6.06	0.43
Walpole	10.10	Separate	167	4.76	790	7,890	0.40	20.81	10.01	1.92
Braintree	17.70	Separate	474	4.30	2,040	18,300	0.85	13.44	11.15	6.32
Weymouth	—	Separate	—	—	—	22,480	—	16.46	—	—
Totals	1,121.25	—	86,904	6.59	572,940	762,830	50.16	208.52	75.11	24.06

<sup>1</sup> Estimated from Assessors' statement of the number of houses in each city or town on December 31, 1938 and the population from census of 1935.

<sup>2</sup> Parts of Dorchester, Milton, Roxbury and West Roxbury which are situated within the South Metropolitan Sewerage District limits are tributary at present to Boston main drainage works.

<sup>3</sup> At present connected with Boston main drainage system.

<sup>4</sup> Including connection with the Boston State Hospital, having an estimated population of 3,146.

<sup>5</sup> Including connections with the Metropolitan State Hospital and the Middlesex County Tuberculosis Hospital, authorized by Chapter 372 of the Acts of 1928 and chapter 373 of the Acts of 1929, having an estimated population of 2,908.

<sup>6</sup> Includes 3.65 miles of trunk sewer built by Waltham for the joint use of Waltham, Watertown, Metropolitan State Hospital, and Middlesex County Tuberculosis Hospital, authorized by Chapter 372 of the Acts of 1928 and Chapter 373 of the Acts of 1929.

<sup>7</sup> Includes 4 manufacturing plants.



BOTH METROPOLITAN SEWERAGE SYSTEMS

Table showing Areas delivering Sewage to both Systems; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas; Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.

(Populations estimated as of December 31, 1938)

SYSTEMS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection	Estimated Population Now Contributing Sewage	Estimated Present Total Population	Estimated Area Now Contributing Sewage	Area Ultimately to Contribute to Sewage	Ratio of Contributing Population to Present Total Population	Ratio of Contributing Area to Ultimate Area
North Metropolitan	1,040.08	Separate and combined	117,426	5.67	692,750	752,660	Sq. Miles 42.90	Sq. Miles 101.49	Per Cent. 92.04	Per Cent. 42.27
South Metropolitan	1,121.25	Separate and combined	86,904	6.59	572,940	762,830	50.16	208.52	75.11	24.06
Totals . . .	2,161.33	-	204,330	6.19	1,265,690	1,515,490	93.06	310.01	83.51	30.02









